IBM Cognos Framework Manager: Design Metadata Models (v10.1)

Volume 1

Student Guide

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Course Overview

IBM Cognos BI Framework Manager: Design Metadata Models (v10.1) is a five-day, instructor-led course that provides participants with introductory to advanced knowledge of metadata modeling concepts, and how to model metadata for predictable reporting and analysis results using Framework Manager. Participants will learn the full scope of the metadata modeling process, from initial project creation, to publishing of metadata to the Web, enabling end users to easily author reports and analyze data.

Intended Audience

- Developers who design metadata models for use in IBM Cognos BI

Topics Covered

Topics covered in this course include:

- Overview of IBM Cognos BI
- Identify common data structures
- Gather requirements
- Create a baseline project
- Prepare reusable metadata
- Model for predictable results
- Create calculations and filters
- Implement a time dimension
- Specify determinants
- Create the presentation view
- Work with different query subject types
- Set security in Framework Manager

- Create analysis objects
- Manage MUNs in Framework Manager
- Model for drill-through in Framework Manager
- Advanced generated SQL concepts and complex queries
- Use advanced parameterization techniques in Framework Manager
- Model maintenance and extensibility
- Optimize and tune Framework Manager models
- Work in a multi-modeler environment
- Manage OLAP data sources
- Manage packages in Framework Manager

Course Prerequisites

Required:

- Knowledge of common industry standard data structures and design
- Experience with SQL
- Experience gathering requirements and analyzing data

Recommended:

- IBM Cognos BI Report Studio: Author Professional Reports Fundamentals (v10.1) or CBT equivalent

Document Conventions

Conventions used in this guide follow Microsoft Windows application standards, where applicable. As well, the following conventions are observed:

Bold	Bold style is used in demo and workshop step-by-step solutions to indicate either: • actionable items (Point to **Sort**, and then click **Ascending**.) • text to type or keys to press (Type **Sales Report**, and then press **Enter**.) • UI elements that are the focus of attention (In the **Format** pane, click **Data**)
Italic	Used to reference book titles.
CAPITALIZATION	All file names, table names, column names, and folder names appear in this guide exactly as they appear in the application. To keep capitalization consistent with this guide, type text exactly as shown.

Workshops

Workshop Format

Workshops are designed to allow you to work according to your own pace. The workshops are structured as follows:

The Business Question Section

The first page of each workshop presents a business-type question followed by a series of steps. These steps provide additional information to help guide you through the workshop. Within each step, there may be numbered questions relating to the step. Solve the tasks by using the skills you learned in this module and in previous ones. If you need more assistance, you can refer to the Task Table section that provides more detailed instruction.

The Task Table Section

The second page of the workshop is a Task Table that presents the question as a series of numbered tasks to be accomplished. The first column in the table states the task to be accomplished. The second column, "Where to Work", indicates the area of the product to work in. Finally, the third column provides some hints that may help you complete the workshop. If you need more assistance to complete the workshop, please refer to the Step-by-Step Instructions at the end of the workshop.

The Workshop Results Section

This section will contain a screen capture(s) of interim or final results and/or answers to the questions asked in the Business Question section.

The Step-by-Step Section

The Step-by-Step instructions for completing all of the tasks are located at the end of the workshop following the Workshop Results section. Each task in the Task Table is expanded into numbered steps, scripted like the demos.

Your Feedback

Your feedback is important and valuable. We are interested in your comments or questions.

Please address them to:

Attn: Senior Manager, Customer Education

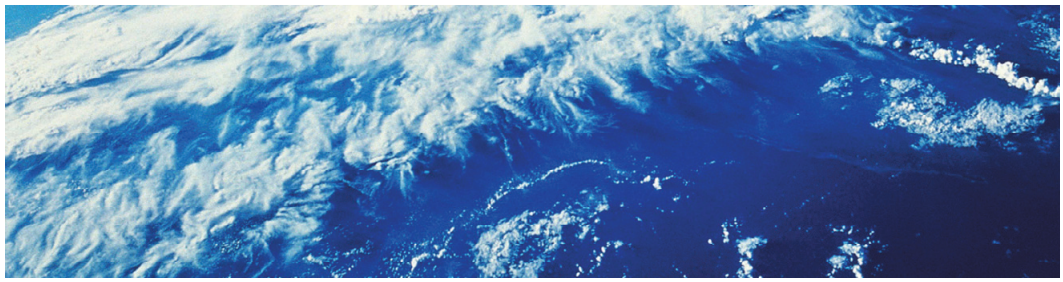
E-mail address: cognos.education@ca.ibm.com

IBM Product Help

Help type	When to use	Location
Task-oriented	You are working in the product and you need specific task-oriented help.	*IBM Product* - Help link
Books for Printing (.pdf)	You want to use search engines to find information. You can then print out selected pages, a section, or the whole book. Use Step-by-Step online books (.pdf) if you want to know how to complete a task but prefer to read about it in a book. The Step-by-Step online books contain the same information as the online help, but the method of presentation is different.	Start/Programs/*IBM Product*/Documentation
IBM on the Web	You want to access any of the following: • Services and Training Web site • Online support • IBM Web site	http://www.ibm.com/Cognos/services http://www.ibm.com/Cognos/support http://www.ibm.com

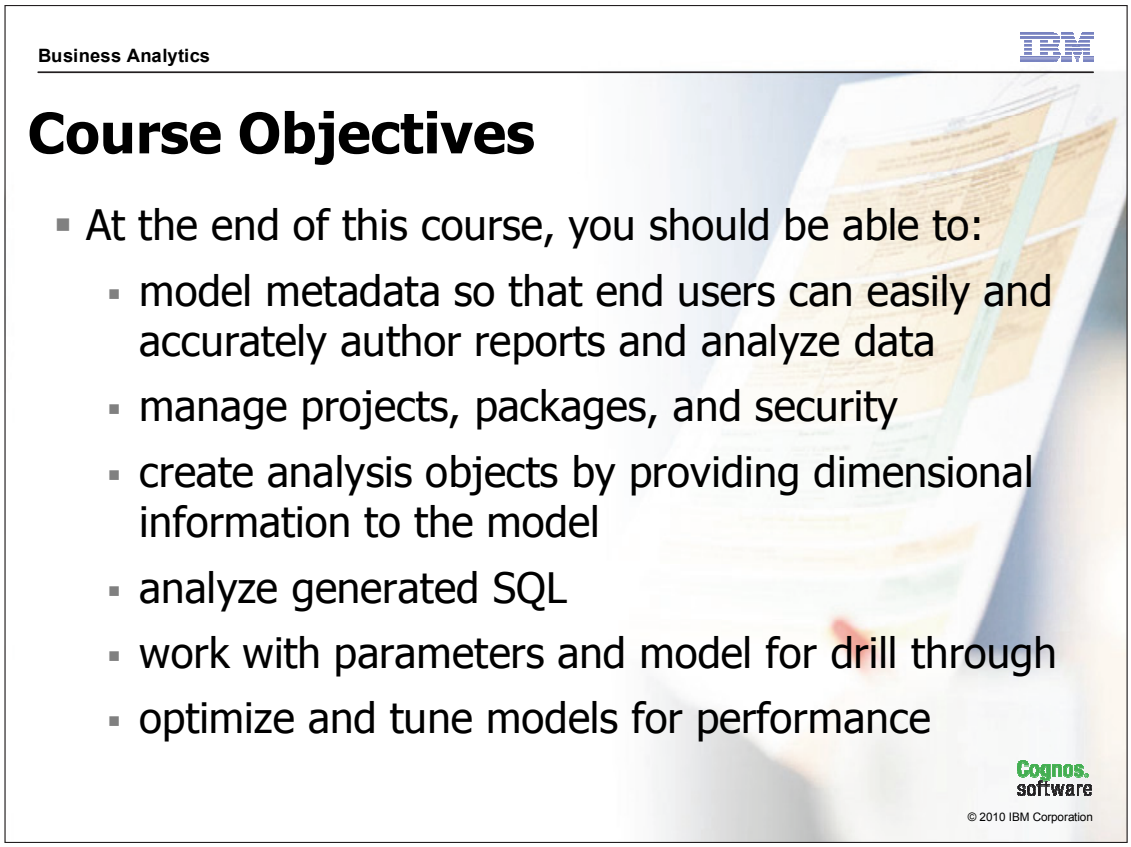
Introduction

IBM Cognos BI



Business Analytics

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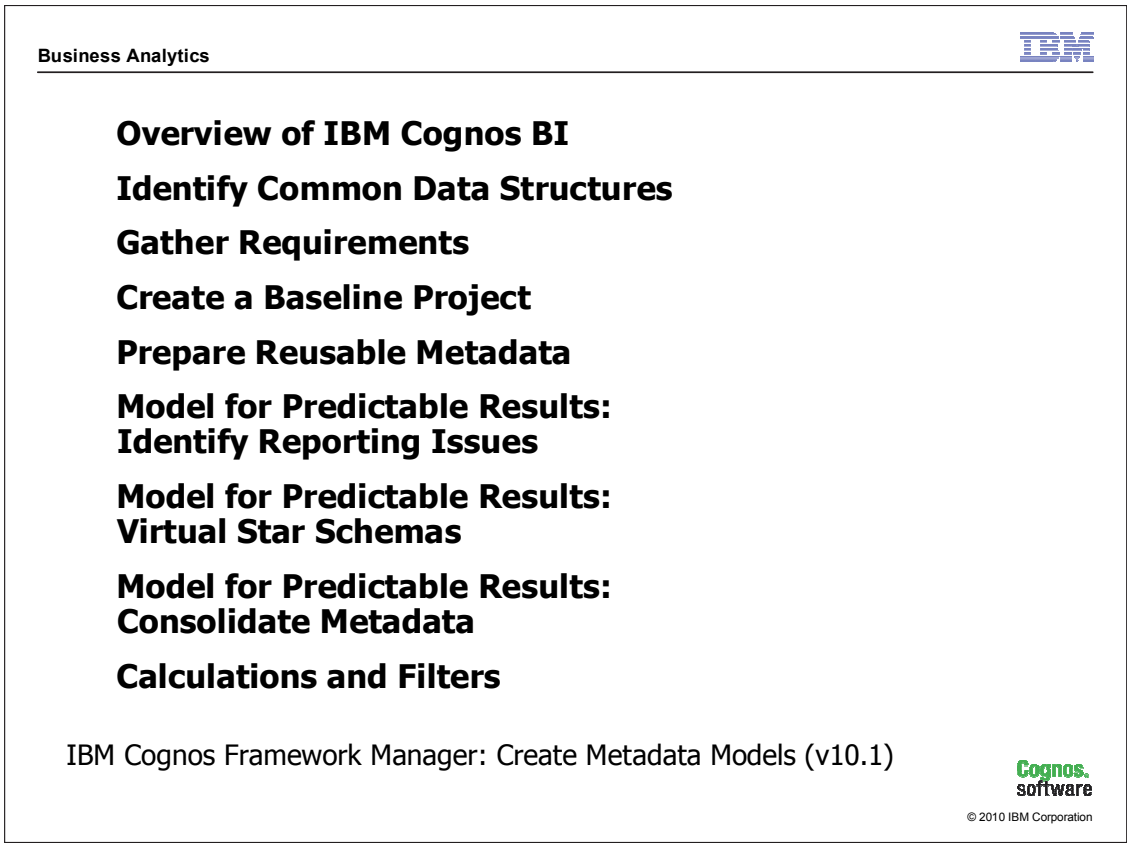


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Intended Audience

- Developers who design metadata models for use in IBM Cognos BI

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Throughout this course, Framework Manager concepts and procedures are grouped into modules that are presented in a logical and structured manner. The hands-on demonstrations and workshops provide the knowledge and skills you will require to create and modify reports in Query Studio.

Prerequisites

Required:

- Knowledge of common industry standard data structures and design
- Experience with SQL
- Experience gathering requirements and analyzing data

Recommended:

- IBM Cognos Report Studio: Author Professional Reports Fundamentals (v10.1) or CBT equivalent

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Business Analytics

Implement a Time Dimension

Specify Determinants

Create the Presentation View

Work with Different Query Subject Types

Set Security in Framework Manager

Create Analysis Objects

Manage MUNs in Framework Manager

Model for Drill Through in Framework Manager

Advanced Generated SQL Concepts and Complex Queries

IBM Cognos Framework Manager: Create Metadata Models (v10.1)

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Business Analytics

Use Advanced Parameter Techniques in Framework Manager

Model Maintenance and Extensibility

Optimize and Tune Framework Manager Models

Work in a Multi-Modeler Environment

Manage OLAP Data Sources

Manage Framework Manager Packages

IBM Cognos Framework Manager: Create Metadata Models (v10.1)

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Business Analytics

Additional Training Resources

Bookmark www.ibm.com/cognos/training for details on:

- instructor-led training in a classroom or online
- self-paced training that fits your needs and schedule
- comprehensive curricula and training paths that help you identify the courses that are right for you
- IBM Cognos Certification program
- other resources that will enhance your success with IBM Cognos software

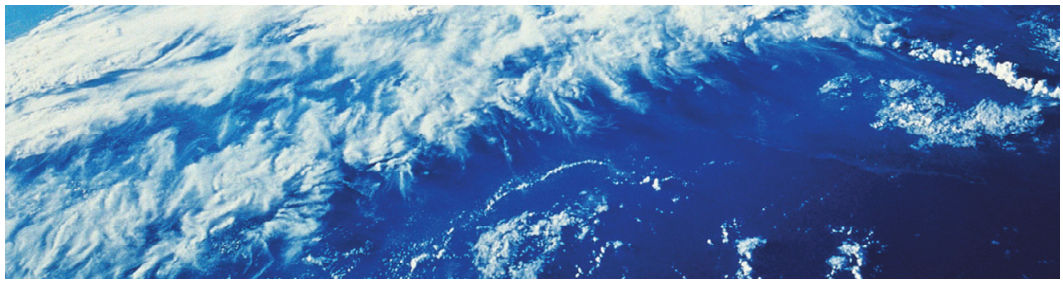
Cognos. software

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Overview of IBM Cognos BI

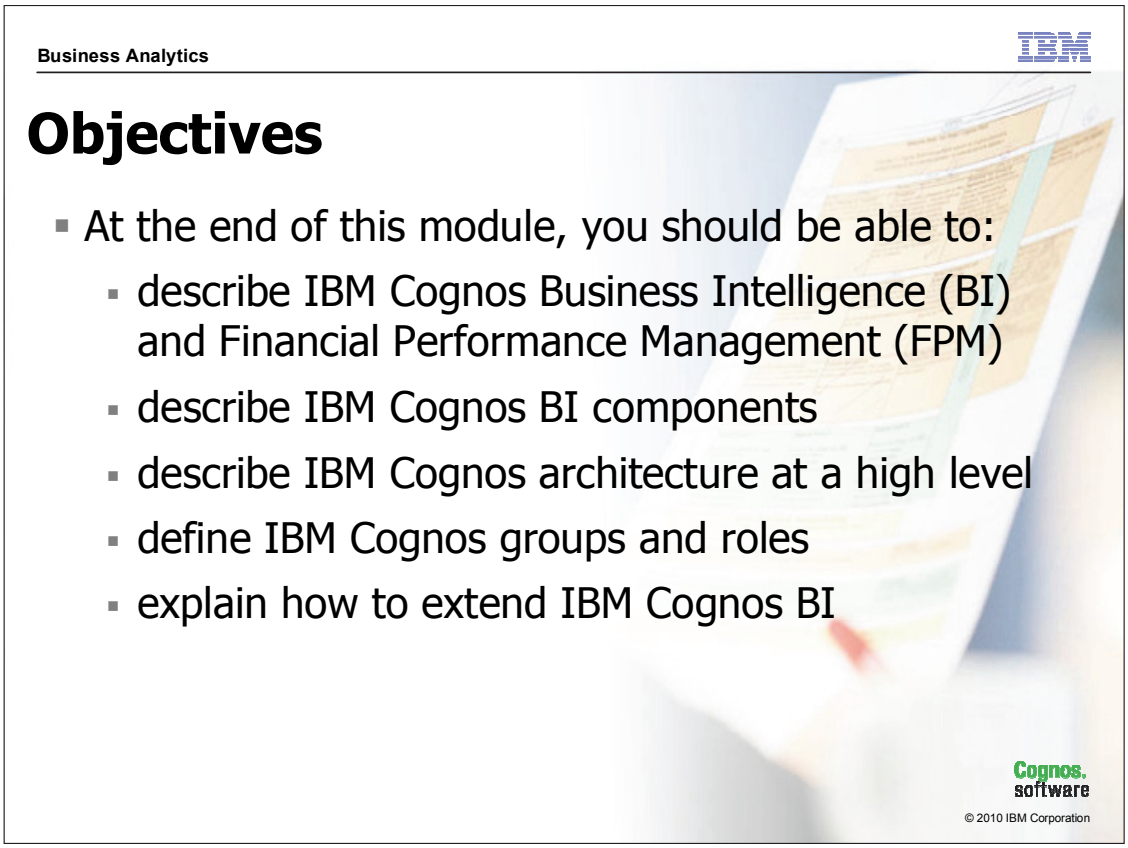
IBM Cognos BI



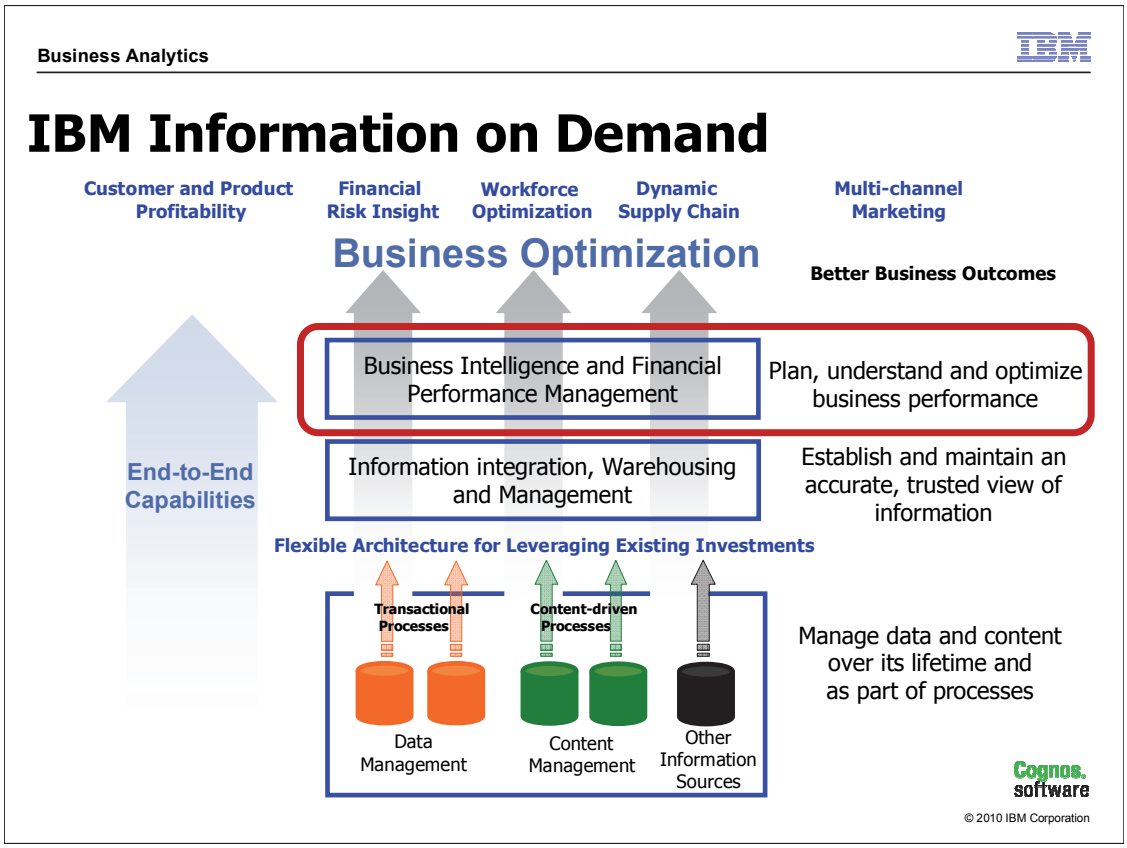
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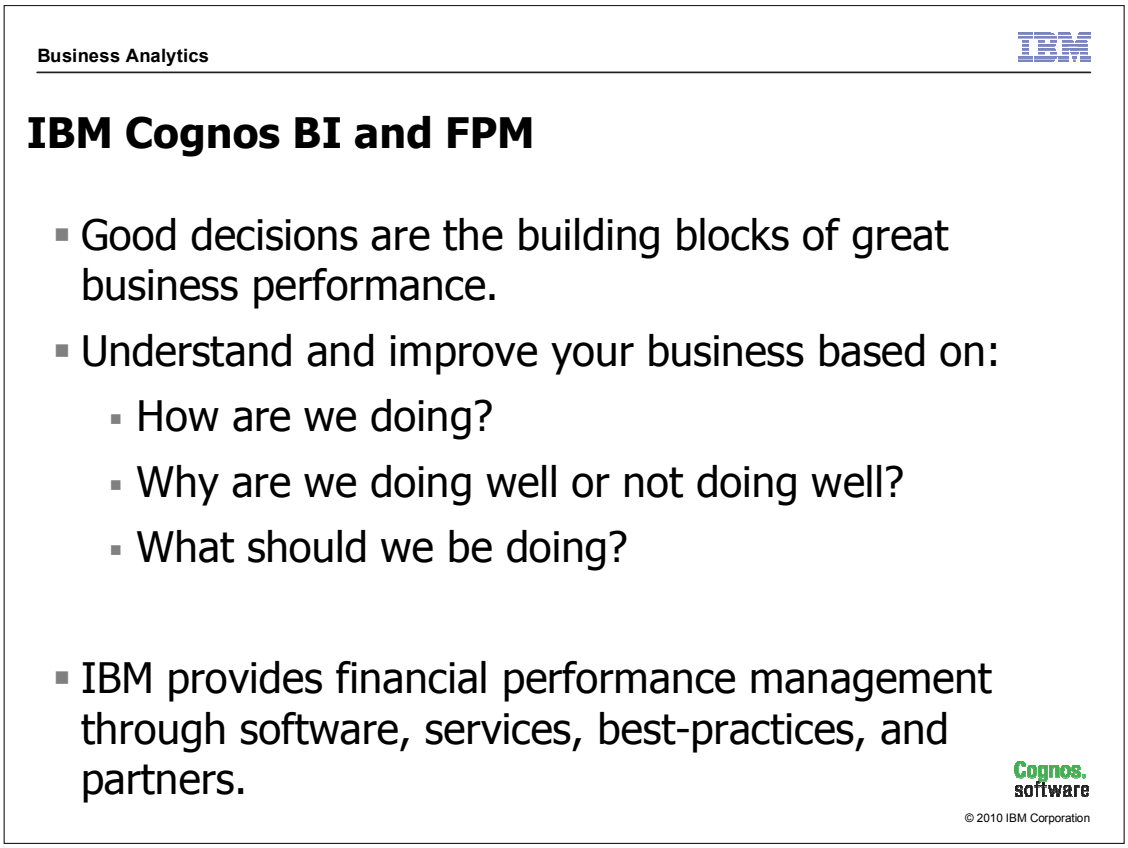


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IBM's Information On Demand strategy helps you achieve better business outcomes for customer and product profitability, increased financial risk insight for better business decisions, an optimized workforce, more dynamic supply chain management, and support for multi-channel, event driven marketing initiatives. The strategy is focused on unlocking the business value of information for competitive advantage.

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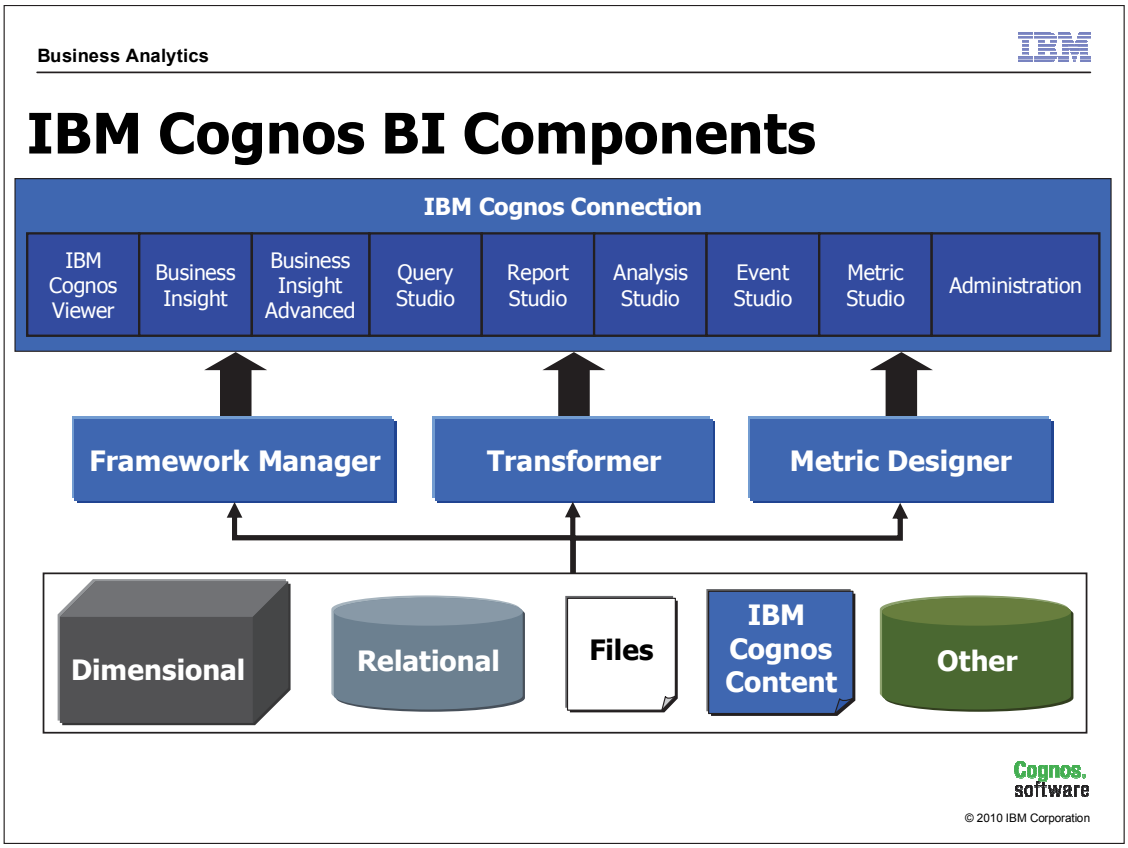
Use IBM Cognos as an open, enterprise-class, platform to answer the following:

- How are we doing? Measuring and monitoring performance with scorecards and dashboards tracks your key metrics.
- Why are we getting these results? Reporting and analysis let you see data, gain context, understand trends, and spot anomalies.
- What should we be doing? Planning, budgets, and forecasts let you set and share a reliable view of the future.

IBM Cognos consists of IBM Cognos BI and IBM Cognos FPM, which are based on a common underlying architecture.

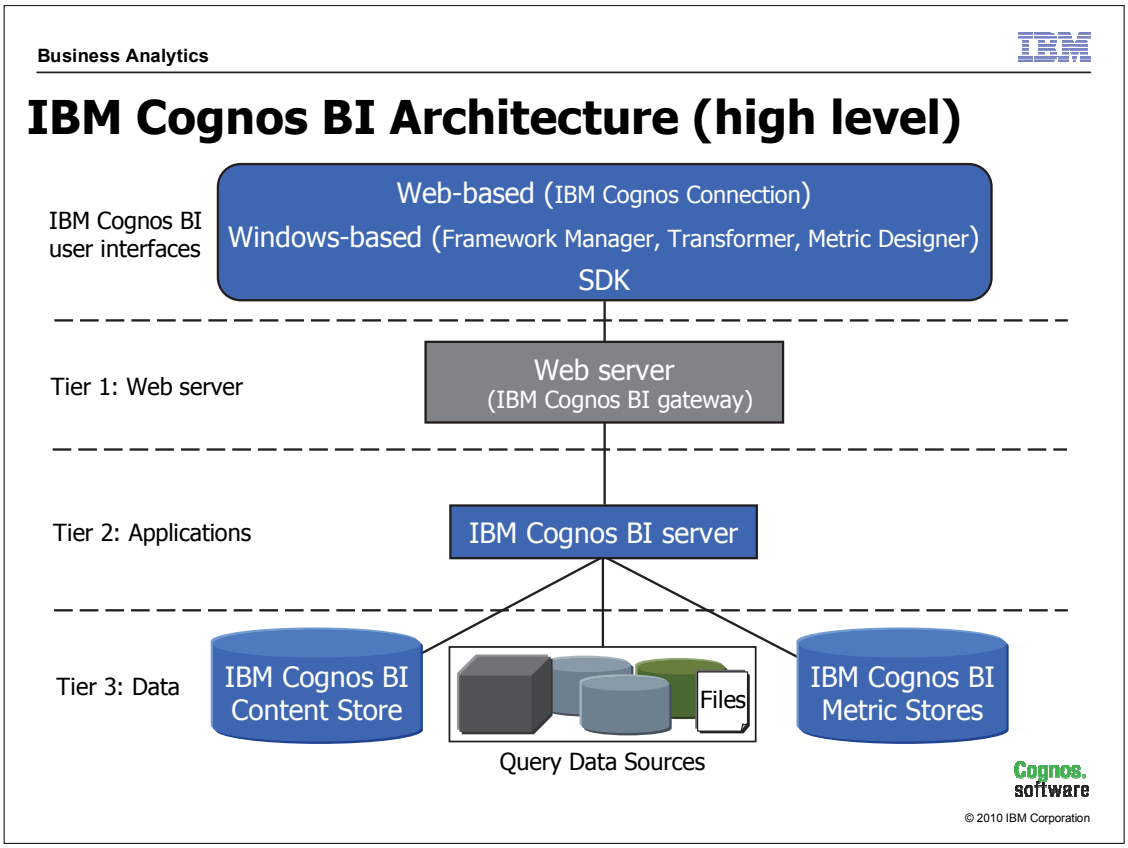
This module focuses on IBM Cognos BI.

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IBM Cognos BI capabilities provide reporting, analysis, scorecarding, dashboarding, business event management, and data integration from a wide array of data sources. IBM Cognos BI includes a portal (IBM Cognos Connection) for BI content presentation, management, and administration, and various studios to author and analyze corporate data. Framework Manager is a metadata modeling tool used to create basic query packages or relationally-based dimensional analysis packages. Transformer is a modeling tool used to create PowerCubes for dimensional analysis. Each publishes packages to IBM Cognos Connection, which are used by authors and analysts in the IBM Cognos studios. Metric Designer is used to create scorecard applications for use in Metric Studio.

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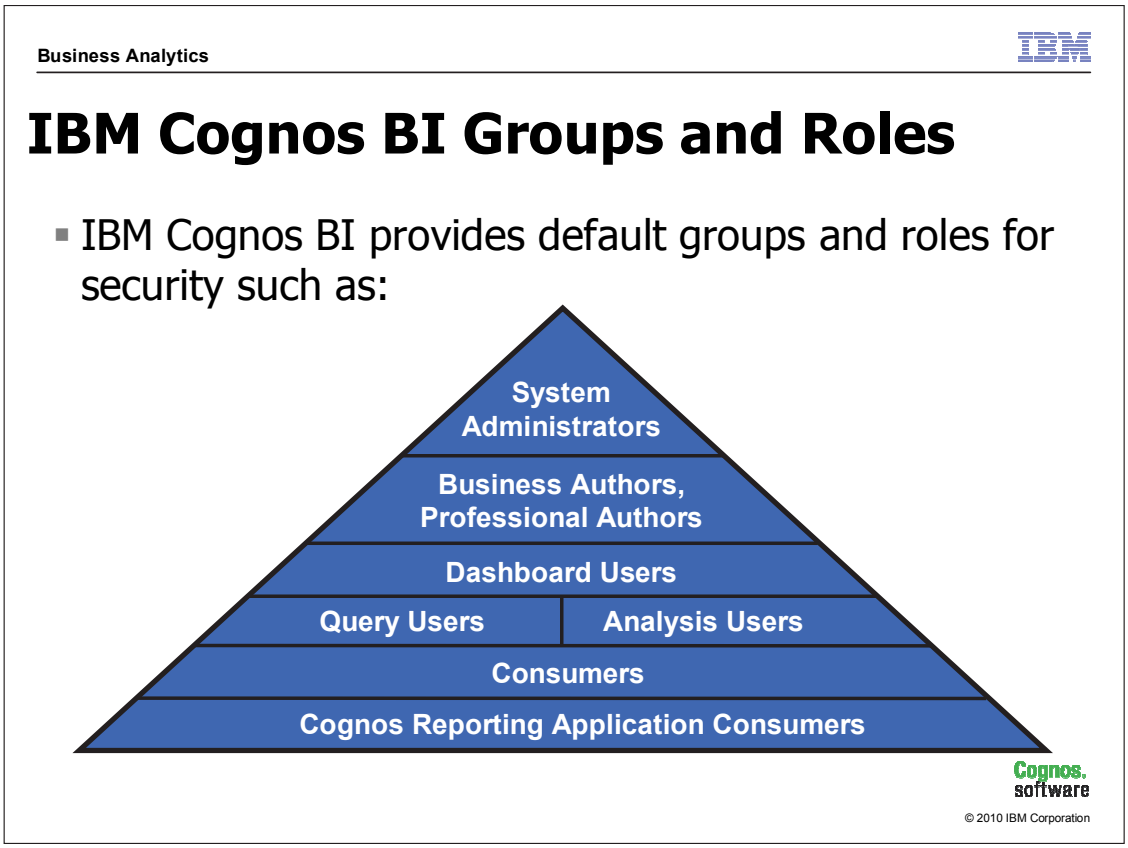
IBM Cognos BI is a Web-based architecture, which is separated into three tiers; Web server, applications, and data.

This architecture is scalable from a software and hardware perspective. For example, you can have several IBM Cognos servers for faster response times and load balancing.

IBM Cognos leverages existing corporate IT resources such as web servers, authentication providers, and application servers, and also supports multiple languages and locales in order to serve a global audience.

IBM Cognos is customizable to adopt your corporate look and feel and can be extended and integrated into other applications through the IBM Cognos SDK.

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Take advantage of IBM Cognos BI groups and roles to secure your IBM Cognos environment and content. The group or role to which a user belongs determines how much access the user has to the IBM Cognos environment. For example, if you are a member of only the Consumers role, you cannot access any of the IBM Cognos studios.

Besides the default groups and roles, you can create new groups and roles that are specific to your IBM Cognos needs. Simply add users from your authentication source to specific groups and roles as required.

Not only can you use the groups and roles defined in the IBM Cognos Namespace to control access to contents, you can use groups in your authentication provider as well.

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Demo 1: Explore IBM Cognos BI

Purpose:
As an introduction to IBM Cognos BI, you will briefly explore one of the modeling tools, IBM Cognos Connection, and various BI studios to familiarize yourself with the environment and BI workflow.

Task 1. Explore IBM Cognos Framework Manager.

You will examine a model in IBM Cognos Framework Manager.

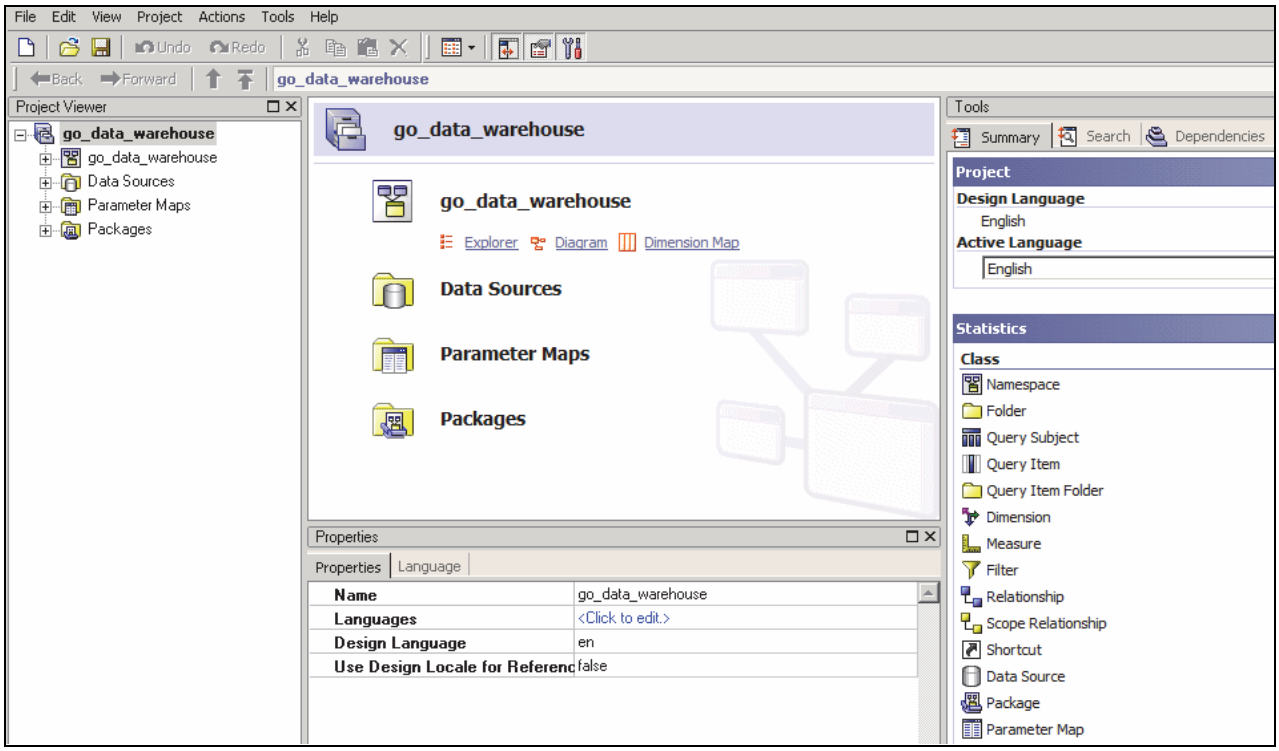
1. From the **Start** menu, point to **All Programs\IBM Cognos 10**, and then click **IBM Cognos Framework Manager**.
2. Click **Open a project**, navigate to **D:\Program Files\IBM\cognos\c10\webcontent\samples\models\great_outdoors_warehouse**, and then click **great_outdoors_warehouse.cpf**.
3. Click **Open**.

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4. If security is enabled, log in as **admin** (password **Education1!**).

The result appears as follows:

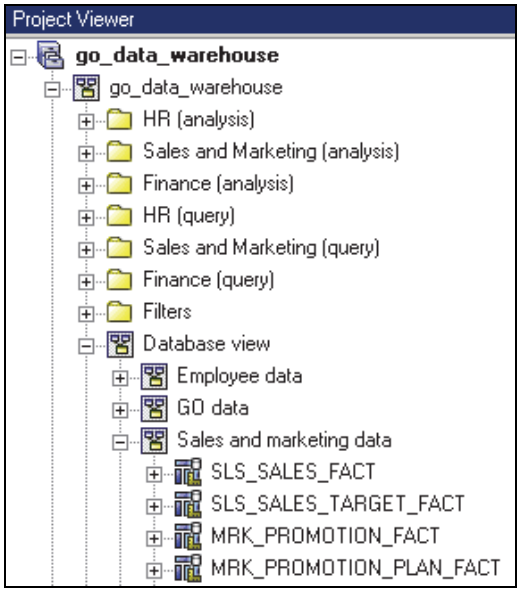


IBM Cognos Framework Manager is one of the modeling tools used to create packages for use in the IBM Cognos studios. This particular tool is primarily used to create metadata models based on relational data sources. Its purpose is to reduce the complexity of the underlying data source by creating user-friendly views of the business for authors and analysts in the IBM Cognos environment. IBM Cognos Framework Manager can also be used to model and publish SAP BW metadata packages as well as publish other Online Analytical Processing (OLAP) packages such as Microsoft Analysis Services cubes.

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5. In the **Project Viewer** pane, expand **go_data_warehouse\Database view\ Sales and marketing data**.

 The result appears as follows:



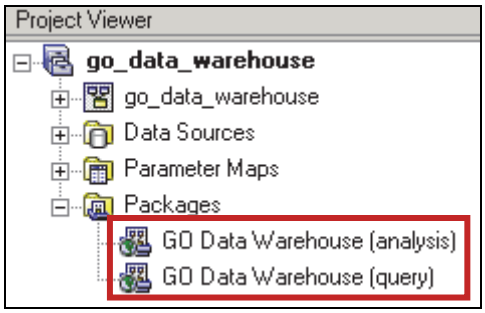
 Metadata modelers work in a project with several object types to create organized views of the business with any required business logic, and remove any ambiguity that might occur. These views are then placed in packages and published to IBM Cognos Connection.

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6. Collapse **go_data_warehouse**, and then expand **Packages**.

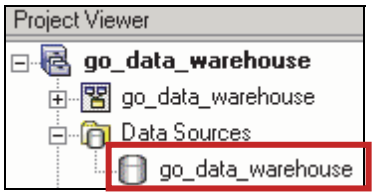
 The result appears as follows:



 Packages can be a subset of the metadata model, or the entire model depending on the requirements. Once published, authors and analysts can choose from the objects contained in the package to create reports, analyses, and so on. Take note of the package names, as you will see them in IBM Cognos Connection shortly.

7. Expand **Data Sources**.

 The result appears as follows:



 Data Sources contain the information that IBM Cognos uses to connect to and retrieve data from the underlying data sources cited in the model.

8. Close **IBM Cognos Framework Manager**.

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Task 2. Explore IBM Cognos Connection.

You will review the centralized portal and navigate the content structure of packages and reports.

1. Start **Internet Explorer** and navigate to **http://localhost:88/ibmcognos**.
2. If security is enabled, log in as **admin**, password **Education1!**.

 The result appears as follows:

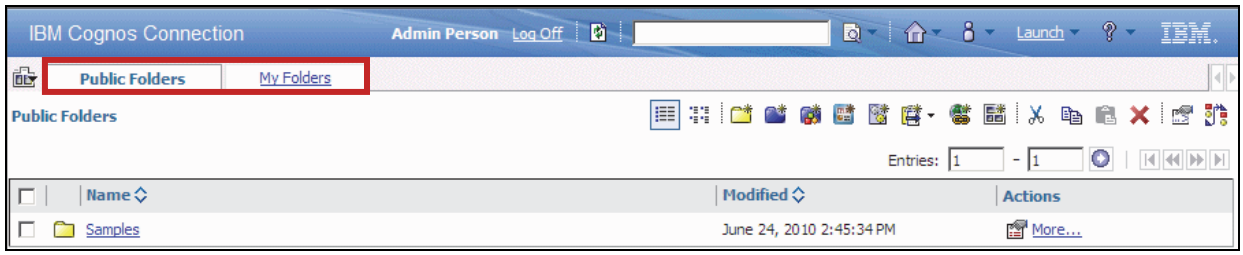


By default, you are presented with a welcome page from which you can choose several activities to perform, such as to query or analyze your data, or perform administrative tasks. Depending on the role to which you belong to as a user, you may have more or less capabilities in the IBM Cognos environment.

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3. Click **IBM Cognos content**.

The result appears as follows:

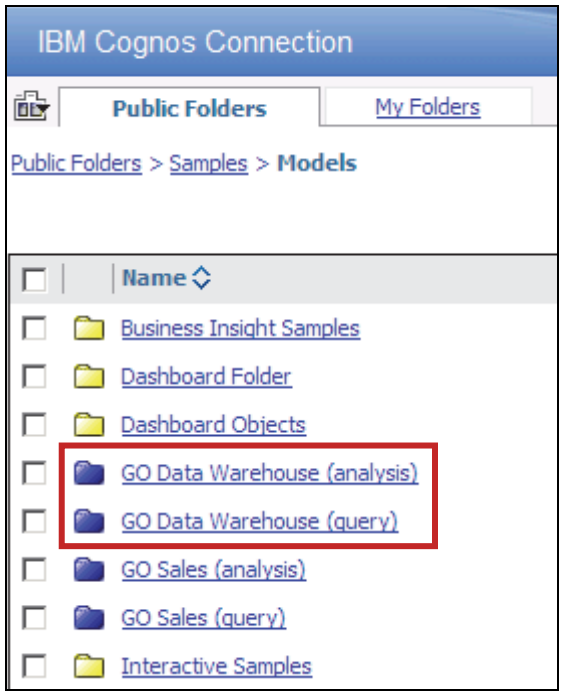


Here you will find public content, found on the Public Folders tab, or personal content, found on the My Folders tab. You also have the ability to create more personal tabs to suit your needs or to share with others. Content, including reports, analyses, and portal pages, are managed and organized in this area.

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4. Click **Samples**, and then click **Models**.

 The result appears as follows:



 Notice the packages named GO Data Warehouse (analysis) and GO Data Warehouse (query). These are the packages you saw in the IBM Cognos Framework Manager project earlier that have been published here.

 Packages, by default, are indicated by a blue folder, and regular folders are yellow in color. Both types of folders can contain reports, analyses and other content.

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5. Click **GO Data Warehouse (query)**, and then click **Report Studio Report Samples**.

 The result appears as follows:



 Here you see several reports based on the GO Data Warehouse (query) package, a model based on a relational data source.

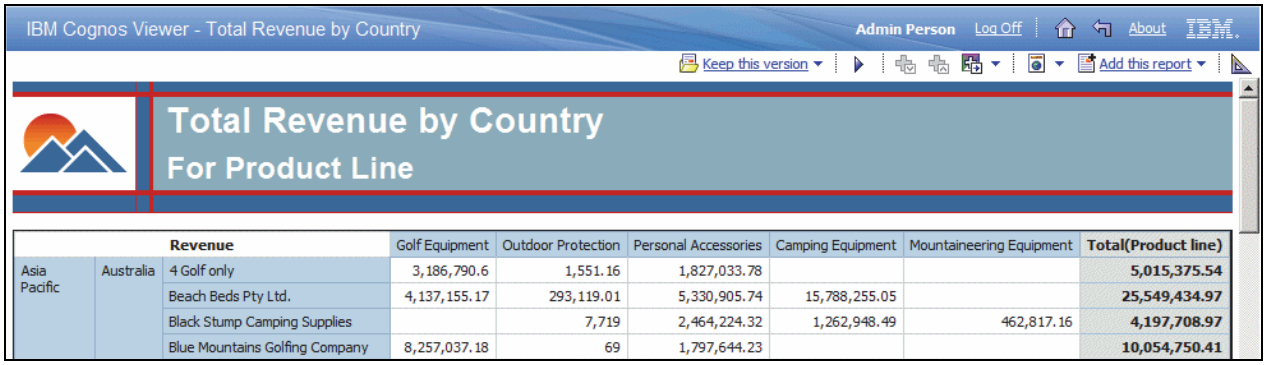
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Task 3. View reports in IBM Cognos.

You will open an existing report based on a relational package and a report based on a dimensional data package.

1. Click **Total Revenue by Country**.

 The result appears as follows:



Revenue			Golf Equipment	Outdoor Protection	Personal Accessories	Camping Equipment	Mountaineering Equipment	Total(Product line)
Asia Pacific	Australia	4 Golf only	3,186,790.6	1,551.16	1,827,033.78			**5,015,375.54**
		Beach Beds Pty Ltd.	4,137,155.17	293,119.01	5,330,905.74	15,788,255.05		**25,549,434.97**
		Black Stump Camping Supplies		7,719	2,464,224.32	1,262,948.49	462,817.16	**4,197,708.97**
		Blue Mountains Golfing Company	8,257,037.18	69	1,797,644.23			**10,054,750.41**

 The report is displayed in IBM Cognos Viewer. When the Total Revenue by Country link was clicked, the report was run and the underlying relational data source was queried for data. This query is needed because there was no saved output for the report. If the report had been previously run and saved, the saved version, by default, would appear in IBM Cognos Viewer. The report would display a snapshot of the data at the time it was last run and in the format specified by the person who ran the report. Formats include HTML, PDF, Excel, and XML.

2. Click **Return**  in the top right corner.

 You will now run a report based on an OLAP data source.

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3. Click the **Samples** link shown below:



Using the path illustrated here, you can easily navigate the content found in IBM Cognos.

4. Click **Cubes**, click **Sales and Marketing (cube)**, and then click **Report Studio Report Samples**.

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5. Click **Top Retailers by Country**, from the prompt select **Extra Sport**, and then click **Finish**.

 A section of the result appears as follows:



 Again, the report is displayed in IBM Cognos Viewer. This report is based on a PowerCube package and uses dimensional functions to perform common OLAP-style queries to compare revenue from selected top retailers for product sets across various time periods.

6. Click **Return** in the top right corner.

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Task 4. Create an analysis.

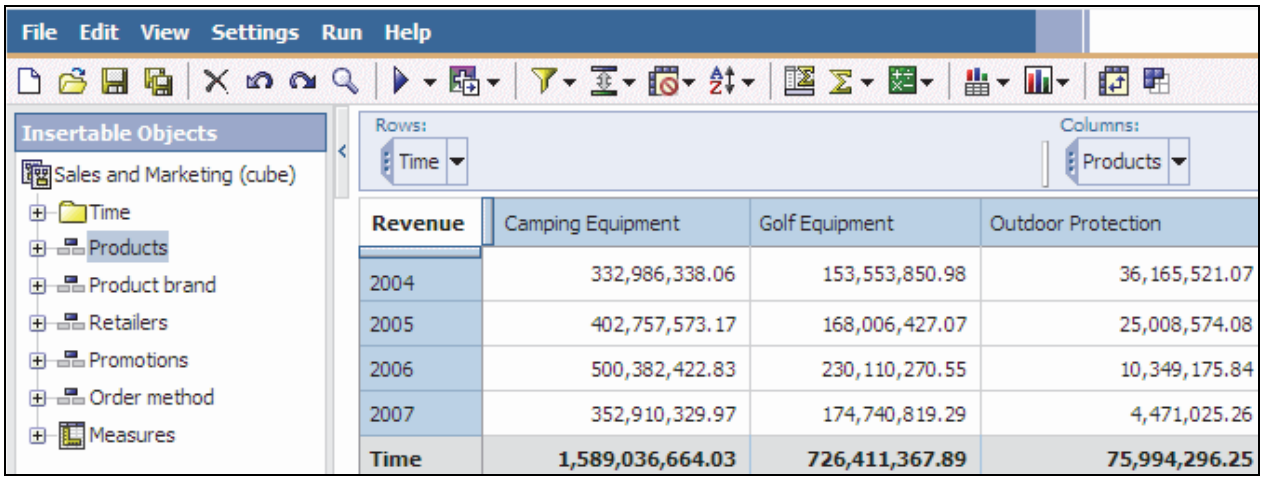
With Analysis Studio, you will create a report, drill down to lower levels of detail, filter for the top two product types in a product line, and then drill through to another report for further analysis of the data.

1. Click **Launch** in the top right corner, and then click **Analysis Studio**.

 Analysis Studio starts in a new browser window.

2. Click **Default Analysis**, and then click **OK**.

 A section of the result appears as follows:



Revenue	Camping Equipment	Golf Equipment	Outdoor Protection
2004	332,986,338.06	153,553,850.98	36,165,521.07
2005	402,757,573.17	168,006,427.07	25,008,574.08
2006	500,382,422.83	230,110,270.55	10,349,175.84
2007	352,910,329.97	174,740,819.29	4,471,025.26
Time	**1,589,036,664.03**	**726,411,367.89**	**75,994,296.25**

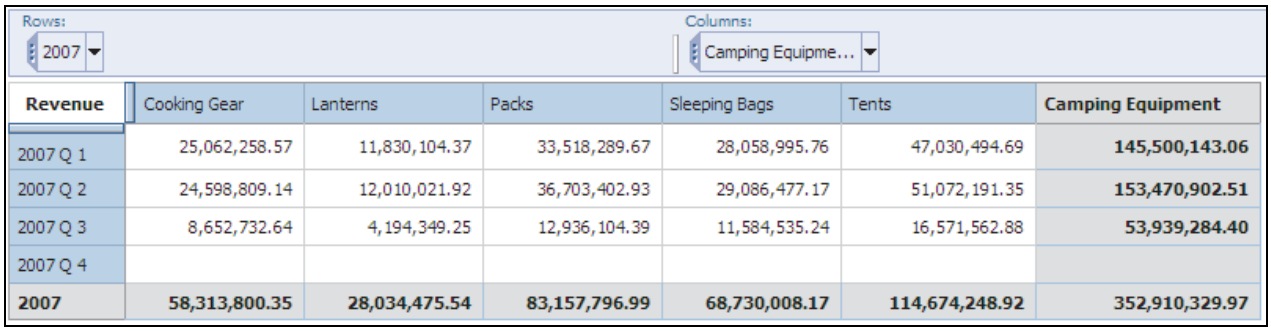
 Analysis Studio opens with the default analysis. You can now drill down or up on the columns and rows to analyze your data.

3. Click the **Camping Equipment** column header to drill down on camping equipment data.

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4. Click the **2007** row header to drill down on 2007 data.

 The result appears as follows:



Rows: 2007 Columns: Camping Equipme...

Revenue	Cooking Gear	Lanterns	Packs	Sleeping Bags	Tents	Camping Equipment
2007 Q 1	25,062,258.57	11,830,104.37	33,518,289.67	28,058,995.76	47,030,494.69	**145,500,143.06**
2007 Q 2	24,598,809.14	12,010,021.92	36,703,402.93	29,086,477.17	51,072,191.35	**153,470,902.51**
2007 Q 3	8,652,732.64	4,194,349.25	12,936,104.39	11,584,535.24	16,571,562.88	**53,939,284.40**
2007 Q 4						
2007	**58,313,800.35**	**28,034,475.54**	**83,157,796.99**	**68,730,008.17**	**114,674,248.92**	**352,910,329.97**

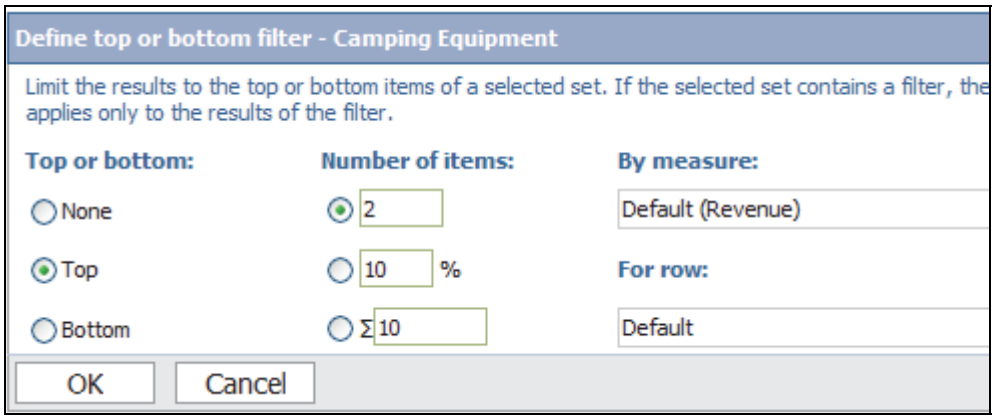
 You will now identify the top two sellers for Camping Equipment using the Top or Bottom feature.

5. On the toolbar, click **Top or Bottom** .

6. In the **Define top or bottom filter** dialog box at the bottom of the page, click **Camping Equipment**.

7. Under **Top or bottom**, select **Top**, and then under **Number of items**, type **2**.

 The results appear as follows:



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8. Click **OK**.

 The analysis now appears with the top two selling items under Camping Equipment based on Revenue.

 The result appears as follows:

Rows: 2007 Columns: Camping Equipme...

Filters are applied. See the Properties pane for more details.

Revenue	Tents	Packs	Subtotal (included)	Camping Equipment
2007 Q 1	47,030,494.69	33,518,289.67	**80,548,784.36**	**145,500,143.06**
2007 Q 2	51,072,191.35	36,703,402.93	**87,775,594.28**	**153,470,902.51**
2007 Q 3	16,571,562.88	12,936,104.39	**29,507,667.27**	**53,939,284.40**
2007 Q 4				
2007	**114,674,248.92**	**83,157,796.99**	**197,832,045.91**	**352,910,329.97**

9. Click **2007** to drill up.

10. From the data tree, drag **Order method** to the columns.

 A section of the result appears as follows:

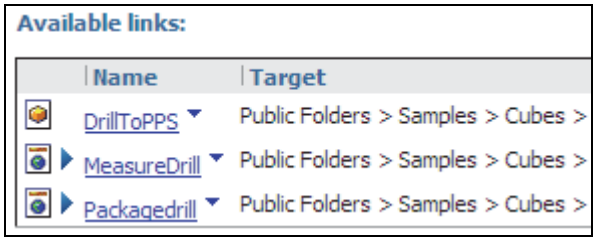
Revenue	Telephone	Sales visit	Web	Sp
2004	43,315,033.73	32,809,658.63	68,436,913.91	
2005	26,588,351.09	24,028,463.24	151,936,538.15	
2006	10,139,286.41	19,056,607.94	238,215,023.04	
2007	5,132,030.02	13,154,582.08	175,571,842.62	
Time	**85,174,701.25**	**89,049,311.89**	**634,160,317.72**	

If configured, you can drill through to a related report to obtain more details about your analysis. This feature works for all report types, such as Report Studio reports and Query Studio reports. You will now drill through to a related report for this analysis.

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11. Right-click the intersection of **Telephone** and **2007**, point to **Go To**, and then click **Related Links**.

 The result appears as follows:



 You are presented with three related links.

12. Click **MeasureDrill**.

 You are presented with a report displaying detailed information related to your analysis that is filtered for the year 2007 and the Telephone order method type.

 A section of the result appears as follows:

Americas

2007

Order method type	Product type	Product	Revenue	Planned revenue
Telephone	Binoculars	Seeker 35	79,823.94	84,021.42
		Seeker 50	52,234.00	54,985.10
		Seeker Extreme	22,560.20	23,747.10
		Seeker Mini	17,881.60	18,823.20
		Opera Vision		
		Ranger Vision		
	Binoculars		**172,499.74**	**181,576.82**
	Climbing Accessories	Granite Carabiner	18,952.00	18,952.00
		Granite Belay	29,725.50	31,290.00

13. Close **IBM Cognos Viewer**, and then close **Analysis Studio**.
14. Click **OK** when prompted to navigate from the page without saving changes.

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Task 5. Create an ad hoc query.

You will use Query Studio to query a relational package and create a grouped list report. Then, you will create a new grouped list report based on a dimensionally modeled relational package that you will drill down on for more detail.

1. In **IBM Cognos Connection**, click **Home**  in the top right corner.

 By default, this action brings you back to the root of Public Folders. You have the option to set a different location as your home page if you wish.

 When you are not in a package folder, you will be prompted to select a package when you start a studio.
2. From the **Launch** menu, click **Query Studio**.
3. In the **List of all packages** section, click **Samples**, click **Models**, and then click **GO Data Warehouse (query)**.

 This is a package based on a relational model. OLAP-style queries are not possible with this package.
4. In the data tree to the left, expand the **Sales and Marketing (query)** folder and the **Sales (query)** namespace, and then add the following items to the report by double-clicking the query item:
 - **Time** query subject: **Year** query item; **Month** query item
 - **Products** query subject: **Product line** query item; **Product type** query item; **Product** query item
 - **Sales fact** query subject: **Revenue** query item
5. Click the **Year** column header, and then Ctrl-click **Month**, **Product line**, and **Product type**.

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6. On the **toolbar**, click **Group** .

 A section of the result appears as follows:

Year	Month	Product line	Product type	Product	Revenue
2004	April	Camping Equipment	Cooking Gear	TrailChef Canteen	176,147.19
				TrailChef Cook Set	683,365.59
				TrailChef Cup	94,837.97
				TrailChef Deluxe Cook Set	931,220.16
				TrailChef Double Flame	536,370
				TrailChef Kettle	391,123.76
				TrailChef Kitchen Kit	316,457
				TrailChef Single Flame	746,007.3
				TrailChef Utensils	156,793.08
				TrailChef Water Bag	564,566.87
			Cooking Gear		**4,596,888.92**
			Lanterns	EverGlow Butane	128,730.1

 This is a basic list report with some grouping applied to make the report easier to read. You will now create a similar report but using a dimensional package.

 In order to create a report with a different package, you will need to close this session of Query Studio, and launch the studio with the different package.

7. Click **IBM Cognos Connection**  in the top right corner, and then click **No** if prompted to save changes.
8. From the **Launch** menu, click **Query Studio**.
9. On the **List of all packages**, click **Samples**, click **Models**, and then click **GO Data Warehouse (analysis)**.

 This package is based on a dimensionally modeled relational (DMR) model. This means that the model developer has provided dimensional information to a relational model to allow authors and analysts to perform OLAP-style queries at run time on a relational data source.

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10. In the data tree to the left, expand the **Sales and Marketing (analysis)** folder and the **Sales** namespace, and then add the following items to the report by dragging each to the report layout:
 - **Time** dimension: **Year** level; **Month** level
 - **Products** dimension: **Product line** level; **Product type** level; **Product** level
 - **Sales fact** dimension: **Revenue** fact

 Note: Instead of query subjects and query items, you are now dealing with dimensions , levels  and facts .

11. Group the report on **Year**, **Month**, **Product line**, and **Product type**.

 The result appears as follows:

Year	Month	Product line	Product type	Product	Revenue
2004	January 2004	Camping Equipment	Cooking Gear	TrailChef Canteen	240,887.99
				TrailChef Cook Set	747,929.81
				TrailChef Cup	103,359.04
				TrailChef Deluxe Cook Set	975,374.4
				TrailChef Double Flame	672,015.15
				TrailChef Kettle	438,465.42
				TrailChef Kitchen Kit	446,124.18
				TrailChef Single Flame	775,939.5
				TrailChef Utensils	383,800.55
				TrailChef Water Bag	387,150.31
			Cooking Gear		**5,171,046.35**
			Lanterns	EverGlow Butane	155,000.72
				EverGlow Double	47,448.93

Notice that this report contains underlined items, in this case, Month and Product. You can drill down on these items to further analyze your data. The same type of behavior applies to OLAP data sources.

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12. Click **January 2004**, and then click **TrailChef Water Bag**.

 The result appears as follows:

Month	Day	Product type	Product	Product details	Revenue
January 2004	20040112	Cooking Gear	TrailChef Water Bag	TrailChef Water Bag 1110	317,591.04
			TrailChef Water Bag		**317,591.04**
		Cooking Gear			**317,591.04**
	20040112				**317,591.04**
	20040113	Cooking Gear	TrailChef Water Bag	TrailChef Water Bag 1110	49,469.89
			TrailChef Water Bag		**49,469.89**
		Cooking Gear			**49,469.89**
	20040113				**49,469.89**
	20040114	Cooking Gear	TrailChef Water Bag	TrailChef Water Bag 1110	15,450.24
			TrailChef Water Bag		**15,450.24**
		Cooking Gear			**15,450.24**
	20040114				**15,450.24**
	20040122	Cooking Gear	TrailChef Water Bag	TrailChef Water Bag 1110	4,639.14
			TrailChef Water Bag		**4,639.14**
		Cooking Gear			**4,639.14**
	20040122				**4,639.14**
January 2004					**387,150.31**
Summary					**387,150.31**

 The report is now focused on the dates TrailChef Water Bag items were sold in the month of January 2004.

13. Right-click **TrailChef Water Bag 1110**, and then click **Drill Up**.

14. Right-click **20040112**, and then click **Drill Up**.

 You will now open this report in Report Studio to add a corporate graphic and a prompt page.

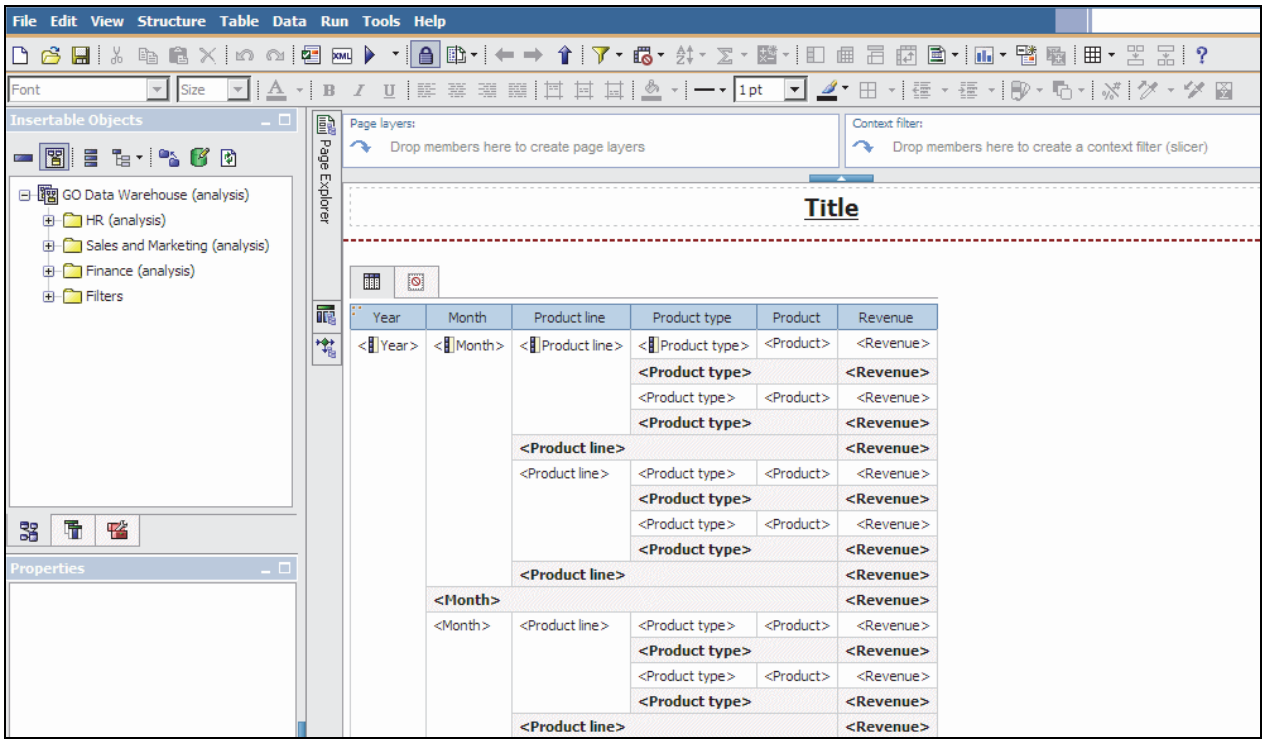
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Task 6. Enhance an ad hoc report in Report Studio.

You will enhance a report that was created in Query Studio, by using Report Studio to add a corporate graphic and a prompt. You will then save the report to IBM Cognos Connection.

1. Under **Menu**, on the left side of the page, click **Manage File**, and then click **Open in Report Studio**.

 A section of the result appears as follows:

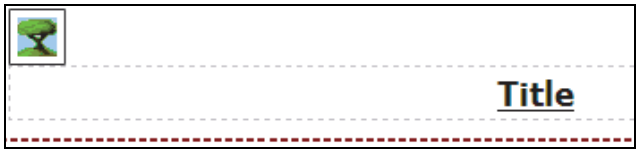


 The report, which opens in Report Studio, can now be enhanced with features that are not available in Query Studio. You are now in a design environment and if you wish to see the data returned by the report, you must run the report.

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2. Under **Insertable Objects**, click the **Toolbox**  tab.
3. Drag an **Image** object to the left of the **Title** box.

 The result appears as follows:

4. Right-click the image item in the report layout, and then click **Edit Image URL**.
5. Click **Browse**, in the list, select **logo_great_outdoors.gif**, and then click **OK**.
6. Click **OK**, and click **Title** to remove focus from the image object.

 The result appears as follows:

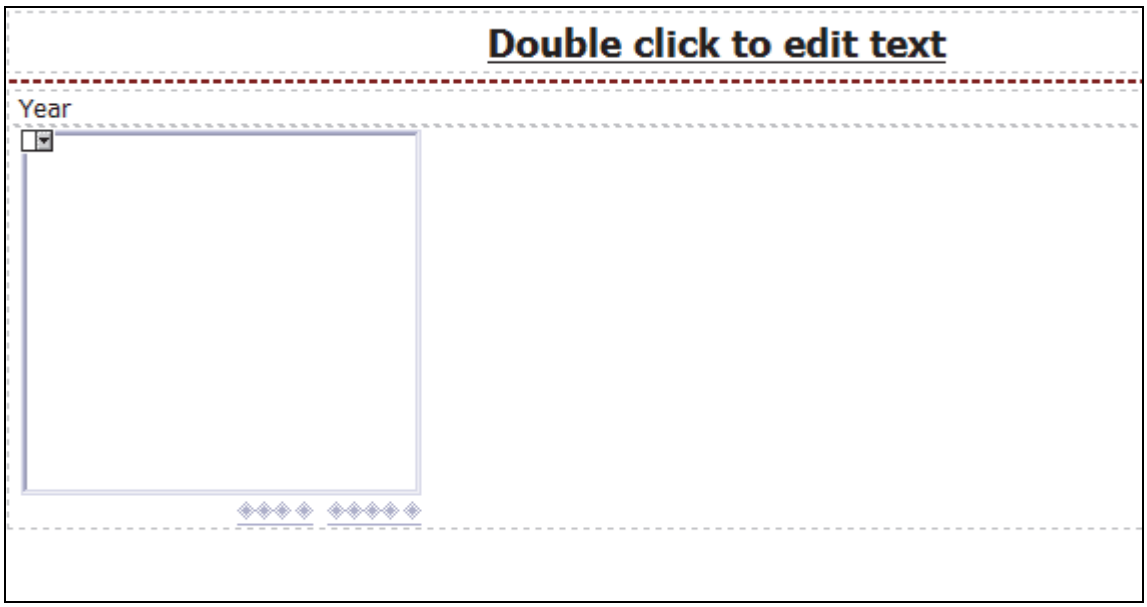
 

 You will now add a prompt page to your report to allow users to filter on a particular year of data.

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7. In the report layout, click the **Year** column header, and then on the toolbar, click **Build Prompt Page** .

 The result appears as follows:

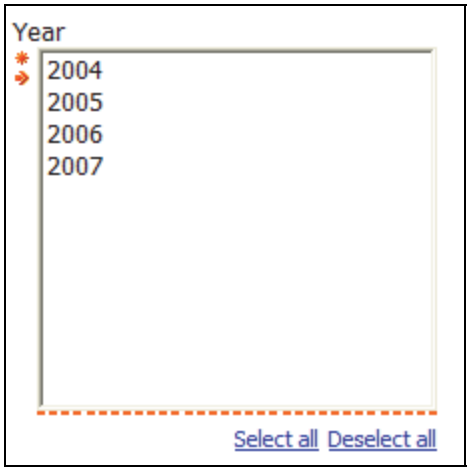


 A prompt page is automatically generated.

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8. On the toolbar, click **Run Report** .

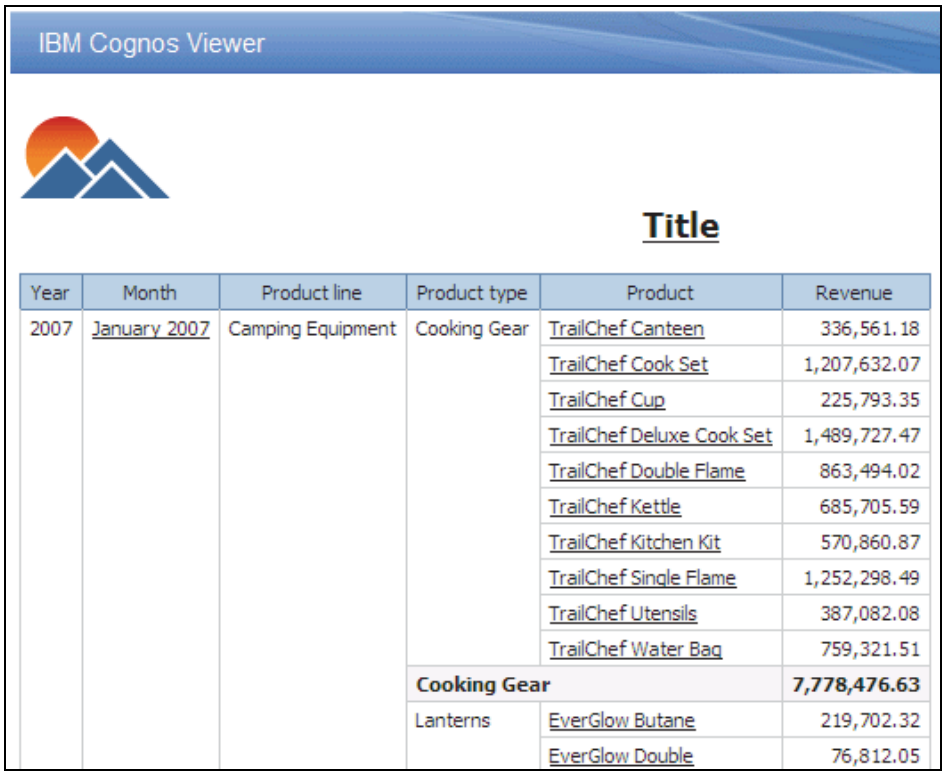
 The result appears as follows:



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9. Select **2007**, and then click **Finish**.

 A section of the result appears as follows:



Year	Month	Product line	Product type	Product	Revenue
2007	January 2007	Camping Equipment	Cooking Gear	TrailChef Canteen	336,561.18
				TrailChef Cook Set	1,207,632.07
				TrailChef Cup	225,793.35
				TrailChef Deluxe Cook Set	1,489,727.47
				TrailChef Double Flame	863,494.02
				TrailChef Kettle	685,705.59
				TrailChef Kitchen Kit	570,860.87
				TrailChef Single Flame	1,252,298.49
				TrailChef Utensils	387,082.08
				TrailChef Water Bag	759,321.51
			Cooking Gear		**7,778,476.63**
			Lanterns	EverGlow Butane	219,702.32
				EverGlow Double	76,812.05

 The report displays the image you inserted as well as data for the year 2007.

 This is a simple example of enhancing a report with Report Studio. Report Studio is capable of many advanced authoring techniques to create professional, dynamic, and robust reports.

10. Close **IBM Cognos Viewer**, and then in **Report Studio**, on the **toolbar**, click **Save** .

11. Under **Save in**, click **My Folders**, and then in the **Name** box, type **Product Revenue: Select Year**.

12. Click **Save**, and then close **Report Studio**.

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13. In **Query Studio**, click **IBM Cognos Connection** , and then click **No** to exit without saving the report.
14. In **IBM Cognos Connection**, click the **My Folders** tab.

 The result appears as follows:



 The report that you saved is displayed. You can save your report to any location that you have access to. You can also copy/cut and paste your report and other objects to organize content in the portal.

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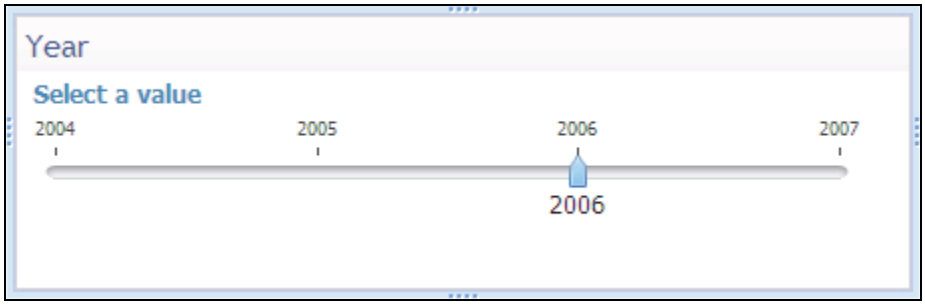
Task 7. Customize a dashboard in Business Insight.

You will use Business Insight to customize and use a dashboard. You will modify a filter, delete an element, add a report part, save the dashboard, and add an annotation to the report data.

1. In **IBM Cognos Connection**, from the **Launch** menu in the top right corner, click **Business Insight**.
2. On the **IBM Cognos Business Insight Getting Started Page**, click **Open Existing**, navigate to **Samples** > **Models** > **Business Insight Samples** > **Marketing Dashboard**, and then click **Open**.

 The dashboard opens in Business Insight, displaying a Slider Filter, a Select Value Filter, and four report widgets.
3. From the **Actions Menu** , click **Save As**, and then save the dashboard in **My Folders** as **My Marketing Dashboard**.
4. In the **Slider Filter**, drag the **slider** to **2006**.

 The Slider Filter appears as follows:

 The report widgets that communicate with this Slider Filter will refresh their displays to reflect the modified filter requirements.

 You want to delete one report widget to customize your dashboard.

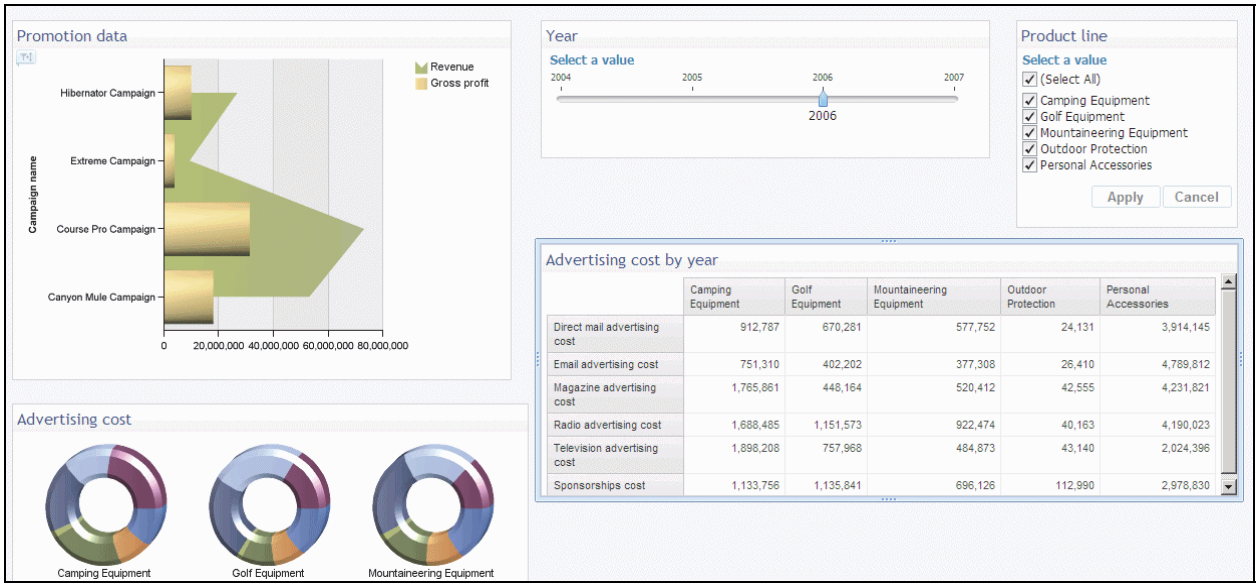
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5. Click the **Promotion plan versus promotion revenue** report widget, click the widget **Actions** menu, click **Remove from Dashboard**, and then click **Remove** to confirm.

 You want to change the layout of the dashboard.

6. Click the **Slider Filter** and drag it near the top of the canvas, and then repeat with the **Select Value Filter** and the **Advertising cost by year** report widget.

 A section of the results appear as follows:



7. On the **Business Insight toolbar**, click **Content** 

.

 On the right side, a content pane displays Content and Toolbox tabs.

8. On the **Content** tab, navigate through the tree by expanding **Public Folders** > **Samples** > **Models** > **GO Data Warehouse (query)** > **Report Studio Report Samples**.

 You can see the reports stored in the folder. Usually, a report would be the end of your navigation capability, however Business Insight allows you to leverage report parts in existing reports.

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9. Click the arrow beside the **Total Revenue by Country** report.

 The tree expands to display charts and lists that exist in the current report. You want use one of these report parts in your dashboard.

10. Click **Crosstab11111**, and drag it to the canvas, below the **Advertising cost by year** report widget.

 A new report widget is placed on the canvas, and the crosstab is displayed.

 You want to add a comment about the data displayed in the chart. First, you will save the dashboard.

11. From the **Business Insight toolbar**, click **Save**.

12. In the new crosstab report widget, click the intersection of **Harbour Pty Ltd.** and **Camping Equipment**.

 The crosstab cell with 571,323.6 is highlighted.

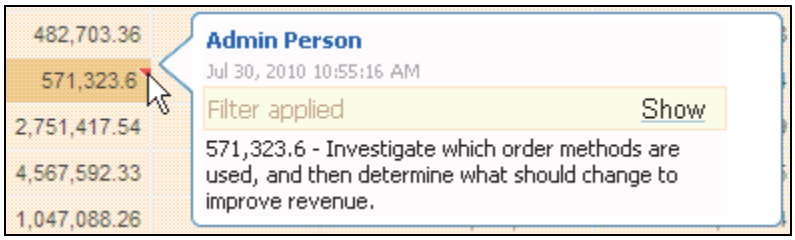
13. Click the mouse cursor over the top of the report widget to reveal the widget toolbar, click **Comment** , click **Add Comment**, and then in the text box enter the following comment: **Investigate which order methods are used, and then determine what should change to improve revenue**.

14. Click **Done**.

 A small red triangle at the top right of the cell indicates that a comment is available for reviewers.

15. Hover the mouse cursor the **red triangular marker**.

 The comment displays, with the name of the author and the date and time that the comment was added. Reviewers who see this dashboard, can review this comment, and add their own comments.



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16. From the **Business Insight toolbar**, click **Save**.
17. Close the dashboard window to return to **IBM Cognos Connection**.

Task 8. Author a report in Business Insight Advanced.

You will use Business Insight Advanced to author a report, include a calculation for analysis of the data, and customize your data by changing measures.

1. In **IBM Cognos Connection**, from the **Launch** menu, click **Business Insight Advanced**.
2. In the **List of all packages**, click **Samples**, click **Models**, and then click **GO Data Warehouse (analysis)**.
3. Click **Create new**, and then double-click **Crosstab** to open a new crosstab report.

 Business Insight Advanced opens, with a report layout area on the left, and the data tree displayed in the Insertable Objects pane on the right. By default, the tree displays members.
4. In the **Insertable Objects** pane, on the **Source** tab, expand the **Sales and Marketing (analysis)** folder, and then expand the **Sales** folder.
5. Expand **Time**.

 There are 4 members displayed in Time: 2004, 2005, 2006, and 2007.
6. In the toolbar above the **Source** tab, click **View Metadata Tree** .
7. On the **Source** tab, expand the **Sales and Marketing (analysis)** folder, expand the **Sales** namespace, and then expand the **Time** dimension.

 The Time hierarchy is displayed. This is different from step 4, where only the members were displayed.

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8. Expand the **Time** hierarchy.

 Under the Time hierarchy, the Members folder is displayed, along with levels such as Year and Quarter.

9. Expand the **Members** folder, and the **Time** member.

 Within the Members folder, is the Time member, and the members 2004, 2005, 2006, and 2007.

 With dimensional data, you can quickly select the view which displays the elements you want to work with by using the View Members Tree button or the View Metadata Tree button.

10. In the toolbar above the **Source** tab, click **View Members Tree** .

11. From the **Insertable Objects** pane > **Source** tab, expand the **Sales and Marketing (analysis)** folder > **Sales** folder, and then add the following items to the report by dragging each to the report layout:

 - **Columns** drop zone: **Time**
 - **Rows** drop zone: **Products**
 - **Measures** drop zone: **Sales fact** > **Revenue**

 The results appear as follows:

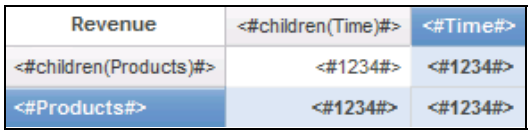
Revenue	2004	2005	2006	2007	Time
Camping Equipment	332,986,338.06	402,757,573.17	500,382,422.83	352,910,329.97	1,589,036,664.03
Personal Accessories	391,647,093.61	456,323,355.9	594,009,408.42	443,693,449.85	1,885,673,307.78
Outdoor Protection	36,165,521.07	25,008,574.08	10,349,175.84	4,471,025.26	75,994,296.25
Golf Equipment	153,553,850.98	168,006,427.07	230,110,270.55	174,740,819.29	726,411,367.89
Mountaineering Equipment		107,099,659.94	161,039,823.26	141,520,649.7	409,660,132.9
Products	914,352,803.72	1,159,195,590.16	1,495,891,100.9	1,117,336,274.07	4,686,775,768.85

 The live data values automatically populate the crosstab as you add each element, and there is no need to run the report separately as you develop it.

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12. From the **View** menu, click **Page Design**.

 The results appear as follows:

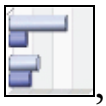


Revenue	<#children(Time)#>	<#Time#>
<#children(Products)#>	<#1234#>	<#1234#>
<#Products#>	<#1234#>	<#1234#>

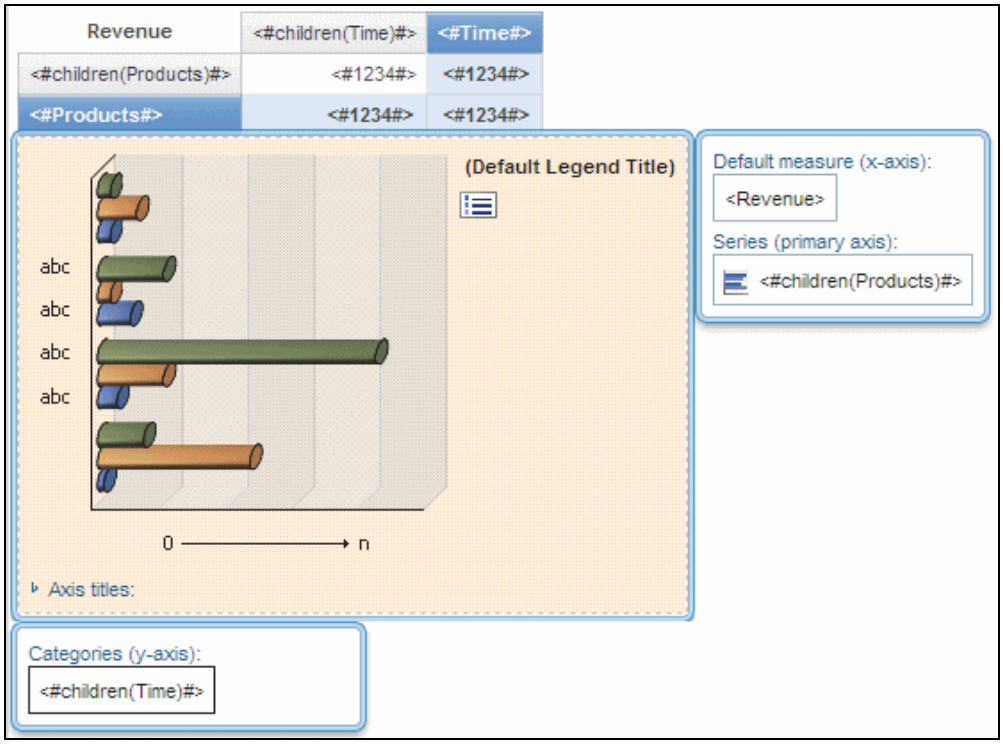
 The crosstab is now filled with placeholders, instead of the live data. You can see the set of members of Time and Products, in the columns and rows respectively, and the Revenue measure placeholders. When working in Page Design mode, to see the data values you will run the report.

13. Click a cell in the crosstab, on the **Insertable Objects** pane > **Toolbox** tab, drag a **Chart** object below the crosstab.

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14. In the left pane click **Bar**, in the right pane click **Clustered Cylinder Bar with 3-D Effects** , click the **Fill with data** check box to select it, and then click **OK**.

 The bar chart is displayed below the crosstab. The chart is automatically populated with the data items (as placeholders) from the crosstab.



15. From the **View** menu, click **Page Preview**.

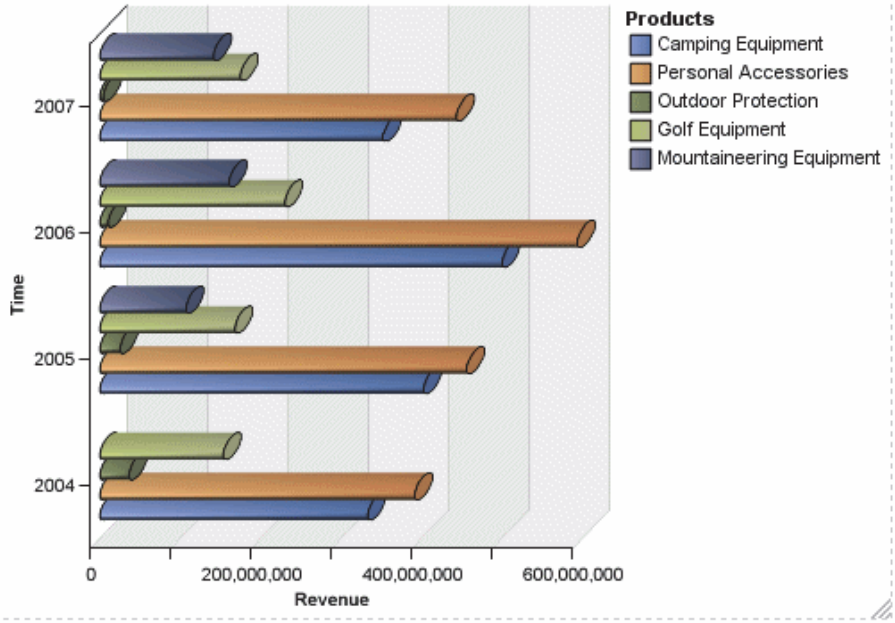
 The crosstab and chart display actual data values.

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16. Click the title text to change the focus from the chart.

The results appear as follows:

Revenue	2004	2005	2006	2007	Time
Camping Equipment	332,986,338.06	402,757,573.17	500,382,422.83	352,910,329.97	1,589,036,664.03
Personal Accessories	391,647,093.61	456,323,355.9	594,009,408.42	443,693,449.85	1,885,673,307.78
Outdoor Protection	36,165,521.07	25,008,574.08	10,349,175.84	4,471,025.26	75,994,296.25
Golf Equipment	153,553,850.98	168,006,427.07	230,110,270.55	174,740,819.29	726,411,367.89
Mountaineering Equipment		107,099,659.94	161,039,823.26	141,520,649.7	409,660,132.9
Products	914,352,803.72	1,159,195,590.16	1,495,891,100.9	1,117,336,274.07	4,686,775,768.85



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17. In the lower right corner of the chart, drag the resize corner to enlarge the chart to be the same width as the crosstab.

 Charts can easily be resized using this method.

 Now that you have reviewed the revenue for the product lines over the years, you want to change the measure to display quantity.

18. On the **Insertable Objects** pane > **Source** tab, under **Sales fact**, click **Quantity**, and drag it to the measures area on the crosstab.

 The crosstab displays the new measure.

19. Right-click the chart, and then click **Update Chart from Crosstab**.

 The chart updates to display the quantity values based on the crosstab.

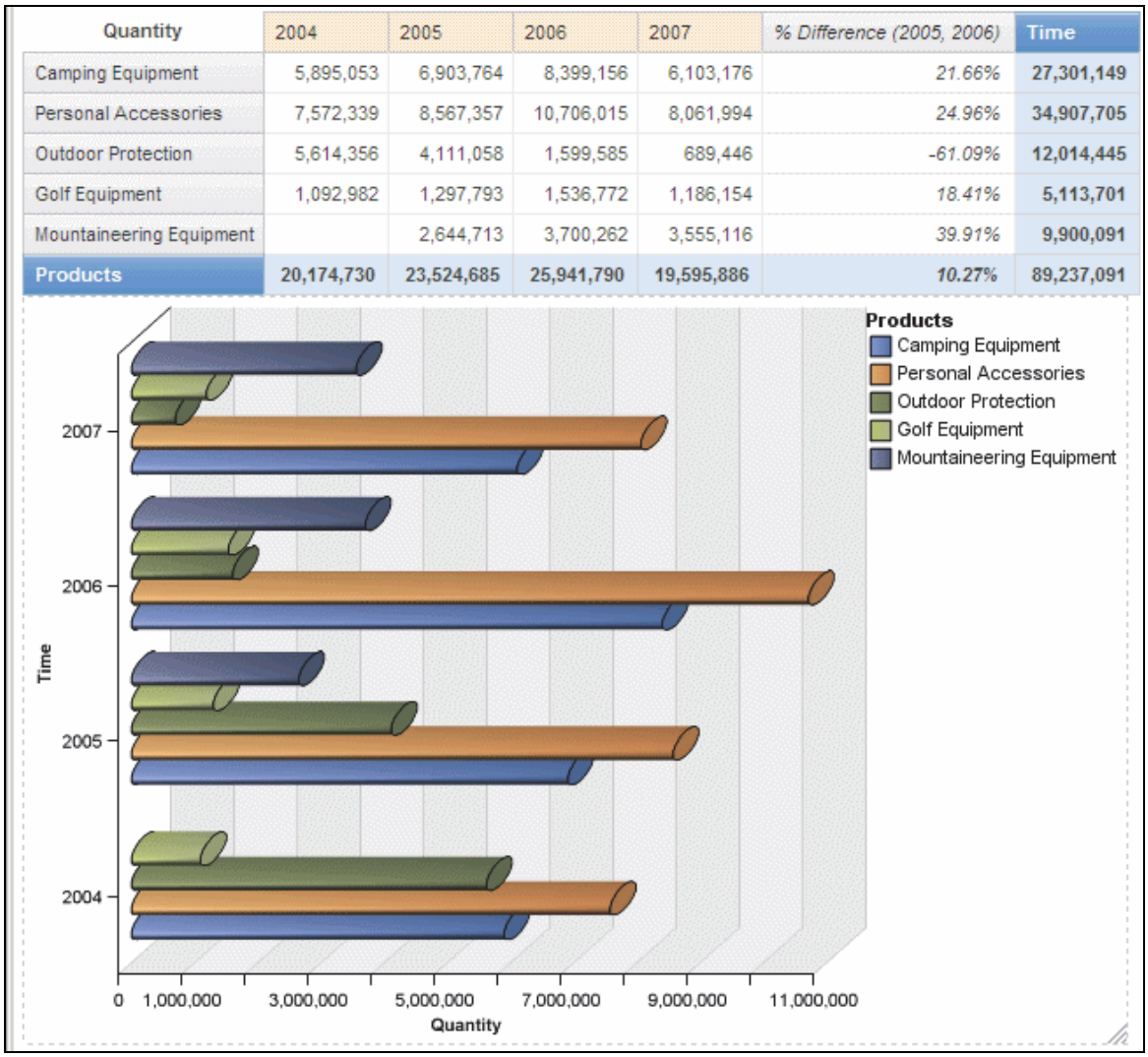
 You want to analyze the previous year-to-year percent difference of quantity for 2005 and 2006. To do this, you will create a variance calculation, using a preset calculation in Business Insight Advanced.

20. In the crosstab, click the **2005** column header and then Shift-click the **2006** column header.

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21. Right-click **2006**, click **Calculate**, and then click **% Difference (2005, 2006)**.

 A new column displays the calculated values for you to review.



Quantity	2004	2005	2006	2007	% Difference (2005, 2006)	Time
Camping Equipment	5,895,053	6,903,764	8,399,156	6,103,176	21.66%	27,301,149
Personal Accessories	7,572,339	8,567,357	10,706,015	8,061,994	24.96%	34,907,705
Outdoor Protection	5,614,356	4,111,058	1,599,585	689,446	-61.09%	12,014,445
Golf Equipment	1,092,982	1,297,793	1,536,772	1,186,154	18.41%	5,113,701
Mountaineering Equipment		2,644,713	3,700,262	3,555,116	39.91%	9,900,091
Products	20,174,730	23,524,685	25,941,790	19,595,886	10.27%	89,237,091

22. In **Business Insight Advanced**, from the **Report Actions** menu, click **Exit**, and do not save changes.

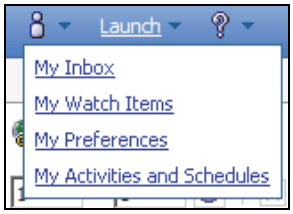
 You are returned to **IBM Cognos Connection**.

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Task 9. Explore preferences.

1. On the **IBM Cognos Connection** toolbar, click **My Area Options** .

 The result appears as follows:

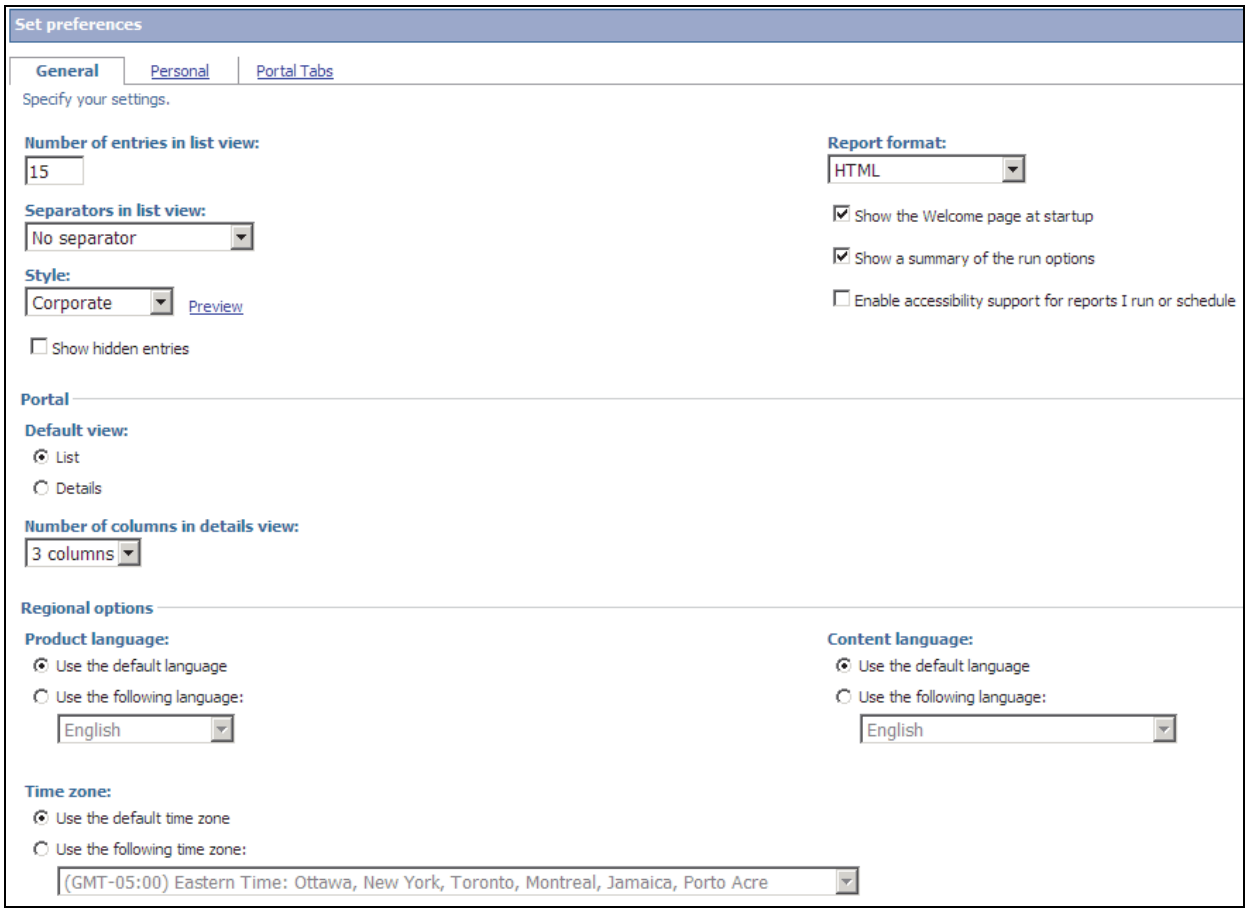
 Here you can view and manage:

 - Inbox (notification requests and ad hoc tasks)
 - watch items (user-specified rules to receive alerts based on values in a report)
 - personal preferences
 - activities and schedules (such as reports you are running or have run in the past, as well as reports you have scheduled to run)

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2. Click **My Preferences**.

A section of the results appear as follows:

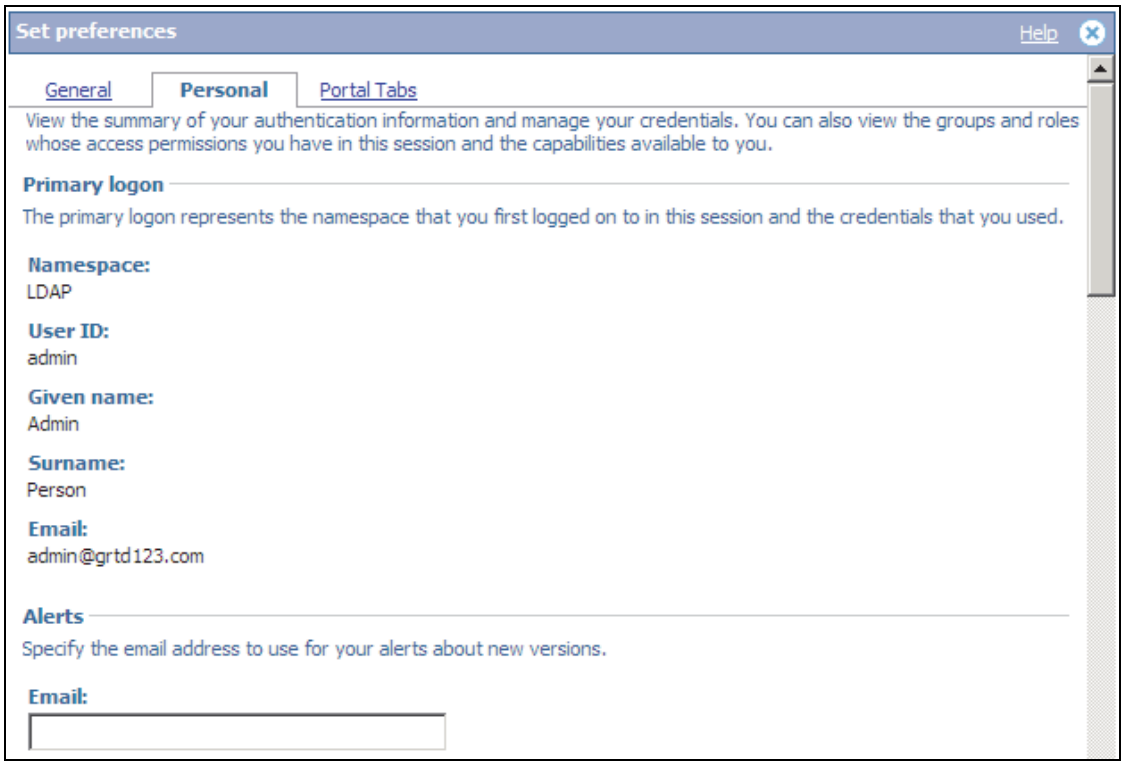


On this tab you can configure your personal portal preferences. For example, you can change the UI language and, if your data and metadata support it, you can change your content language as well.

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3. Click the **Personal** tab.

 A section of the result appears as follows:

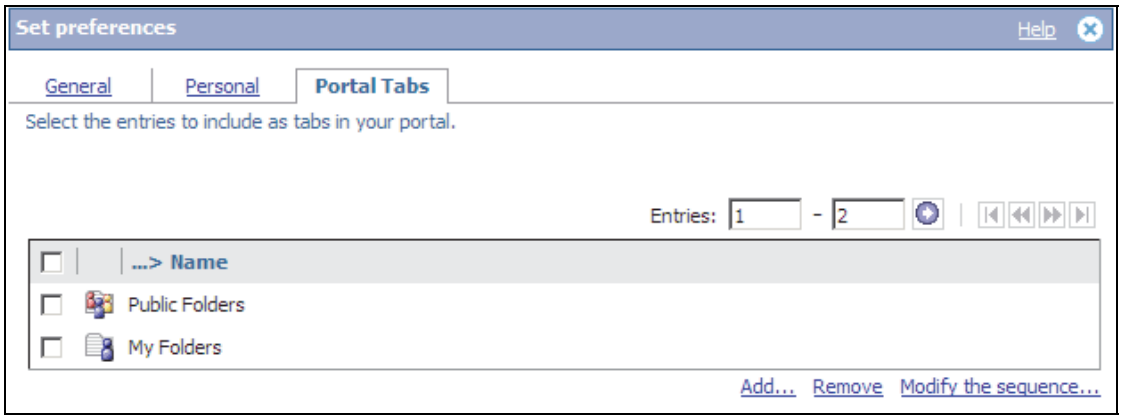


 On this tab you can see your personal information as well as which groups and roles you belong to and which capabilities you have in the IBM Cognos environment (not all elements are shown in the screen capture). Depending on your authentication provider and capabilities, information on this page will differ.

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4. Click the **Portal Tabs** tab.

 The result appears as follows:



 Here you can manage your portal tabs such as adding removing tabs or changing the order of the tabs.

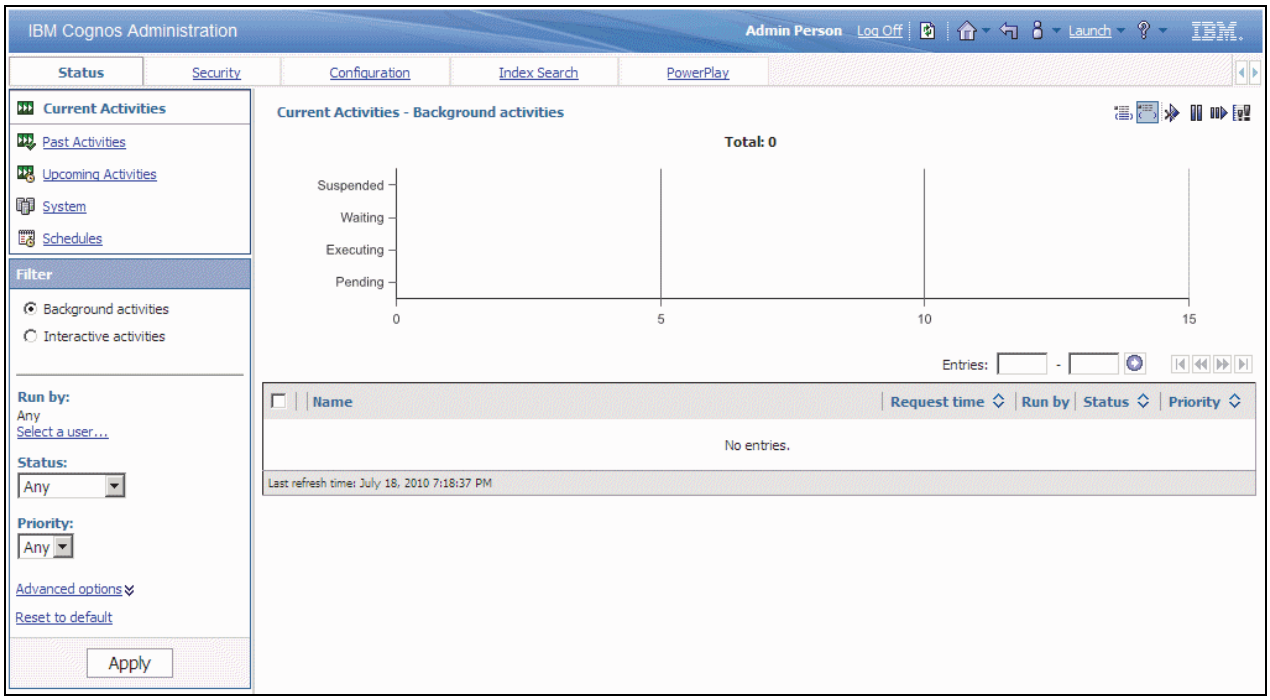
5. Click **Cancel**.

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Task 10. Explore IBM Cognos Administration.

1. From the **Launch** menu, click **IBM Cognos Administration**.

 The result appears as follows:



 This portion of the portal requires administrative access and allows you to monitor and administer IBM Cognos including servers, security, capabilities, data source connections, and the deployment of content.

2. Click **Log Off**, and then close **Internet Explorer**.

Results:
As an introduction to IBM Cognos BI, you briefly explored one of the modeling tools, IBM Cognos Connection, and various BI studios to familiarize yourself with the environment and BI workflow.

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Business Analytics

Extend IBM Cognos BI

- IBM Cognos provides a wide variety of ways to extend IBM Cognos BI.
- For more information, please visit the IBM Cognos Web site http://www-01.ibm.com/software/data/cognos/.

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Summary

- At the end of this module, you should be able to:
 - describe IBM Cognos Business Intelligence (BI) and Financial Performance Management (FPM)
 - describe IBM Cognos BI components
 - describe IBM Cognos architecture at a high level
 - define IBM Cognos groups and roles
 - explain how to extend IBM Cognos BI

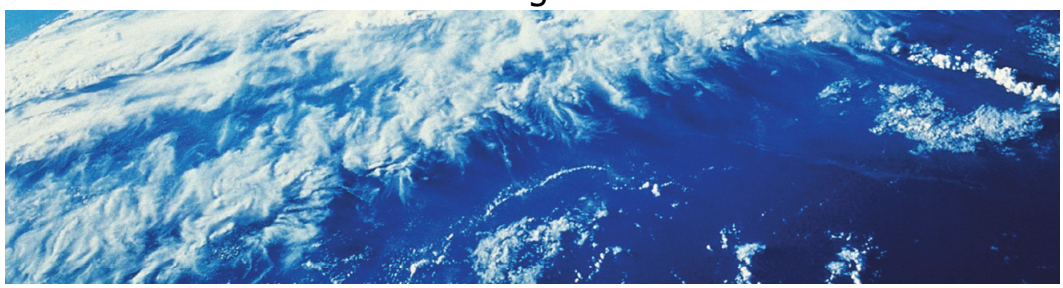
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Identify Common Data Structures

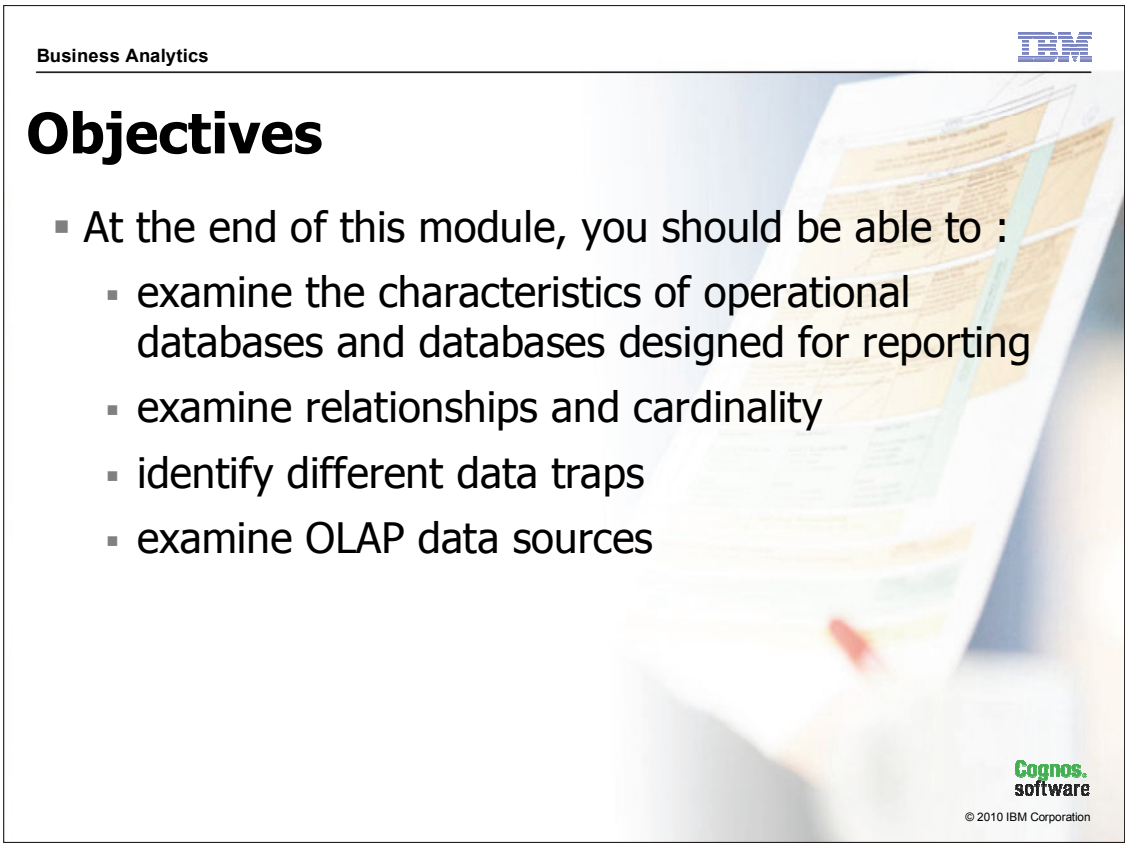
IBM Cognos BI



Business Analytics

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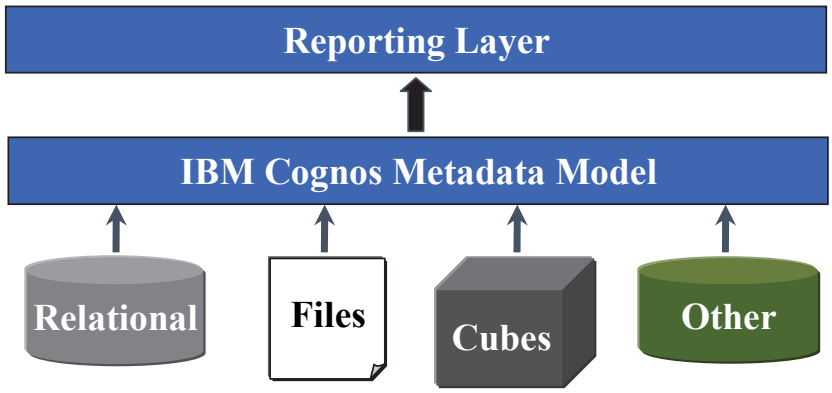


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Business Analytics

Examine the Role of an IBM Cognos Metadata Model

- An IBM Cognos metadata model provides a business presentation view of an organization's data sources.
- BI users use the model to analyze and report on their data sources.



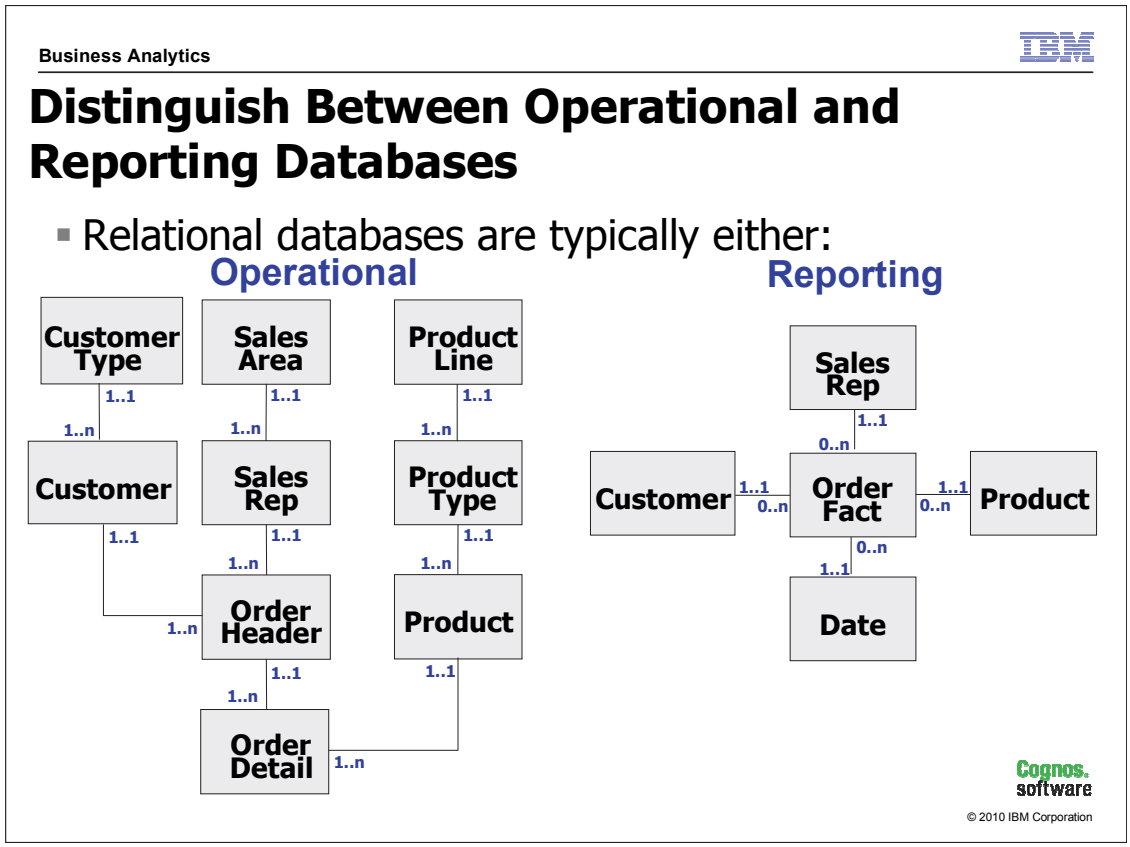
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An IBM Cognos metadata model can hide the structural complexity of your underlying data sources. By creating an IBM Cognos metadata model, you have more control over how your data is presented to IBM Cognos end users. You can also choose which data to display to your end users and how it will be organized. The overall goal of modeling the metadata is to create a model that provides predictable results as well as an easy-to-use view of the metadata for authors and analysts.

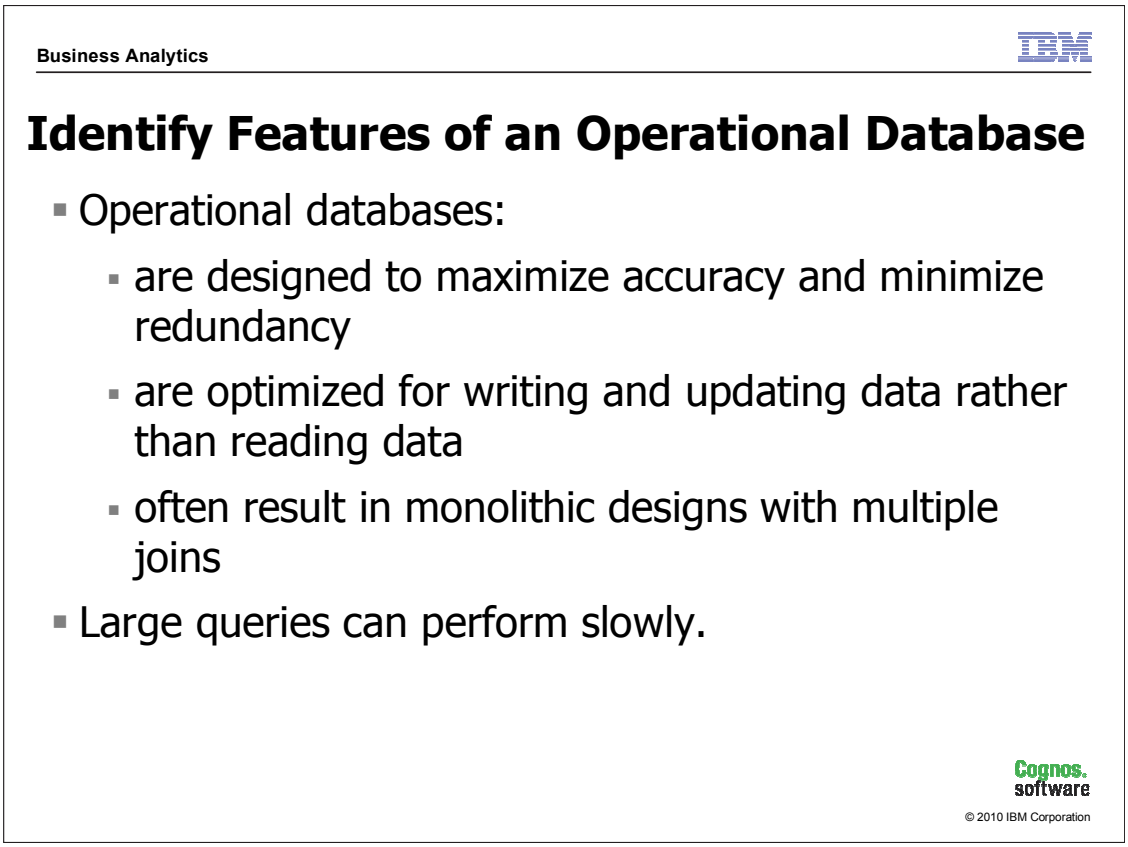
This module will focus on industry standard data structures. This knowledge is essential before beginning a metadata modeling project. Framework Manager topics will be covered in subsequent modules.

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- Operational databases are:
 - used to track the day-to-day operations of a business
 - usually normalized or part of an enterprise resource planning (ERP) vendor package
- Reporting databases are:
 - typically a copy of the operational data
 - structured differently from operational databases to make reporting faster and easier
 - usually dimensional, taking the form of a star schema design

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It can be difficult to report from an operational database because:

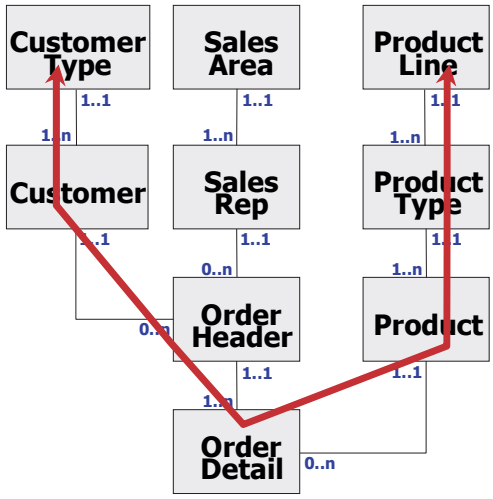
- reading the data can impact the performance of the system
- the number of tables that must be joined to satisfy a business question can be prohibitively large
- a more complex database requires more metadata modeling efforts to make it consumable by business users

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Identify Issues with Operational Databases

- "Show all customer types that bought from a product line."
- The query must check data in seven tables before returning a result set.



Query requires 7 tables

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Operational databases may be too complex for general reporting. As a result, reports that are generated against these structures may take a long time to run. They may also have unpredictable results.

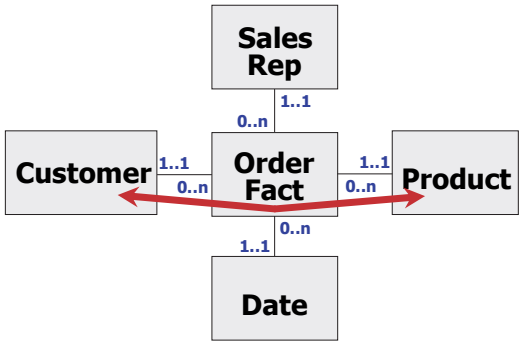
As shown in the slide example, a report may need to access many tables to retrieve all the necessary data.

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Business Analytics

Examine Reporting Databases (Star Schema Design)

- Transactional data is stored in a fact table
- Reference data is stored in separate dimension tables



Query only requires 3 tables

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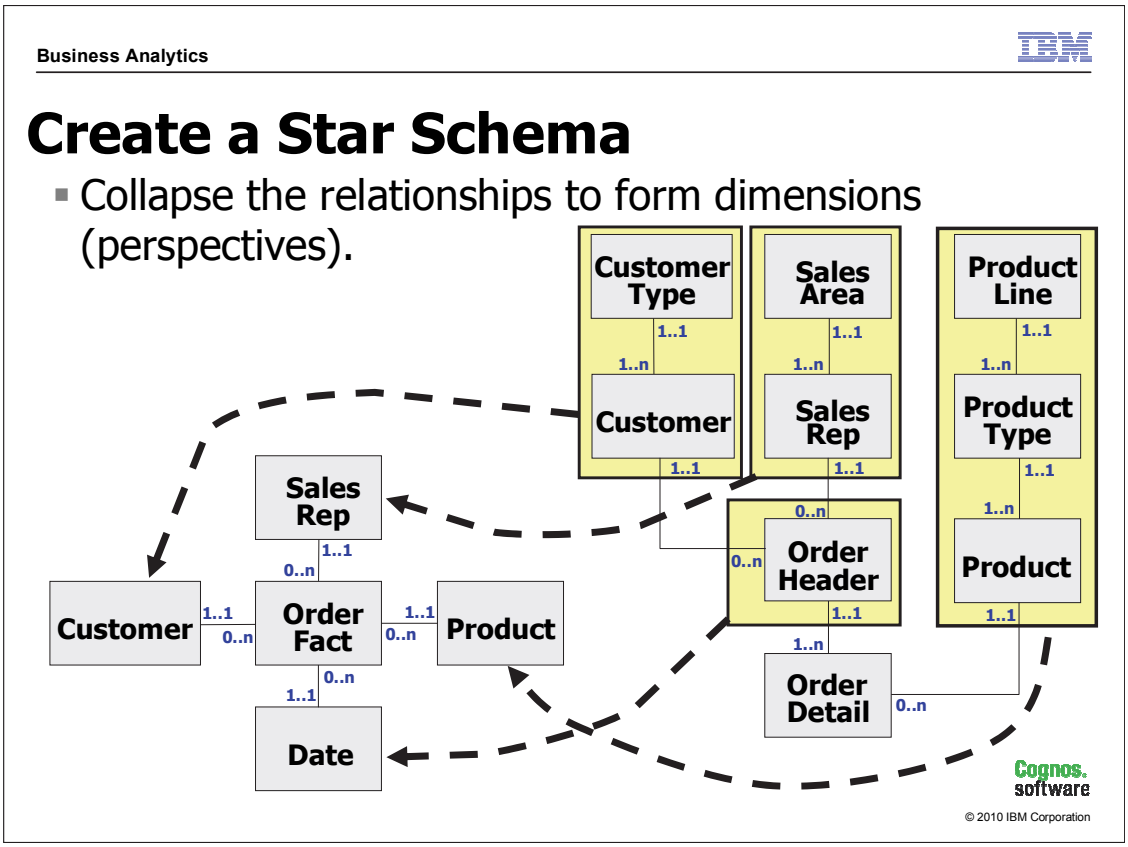
A star schema is a design with two basic components:

- a central table, known as the fact table (typically numeric data)
- satellite tables, known as the dimension tables

Because a star schema database contains fewer tables than a fully normalized database, query performance is much faster.

- A typical query against a star schema database focuses on the central fact table and makes integrity checks against the related dimension tables.
- If the query is to retrieve information about a specific subject area only, such as all the products that belong to a particular product line, then the query will be even faster.

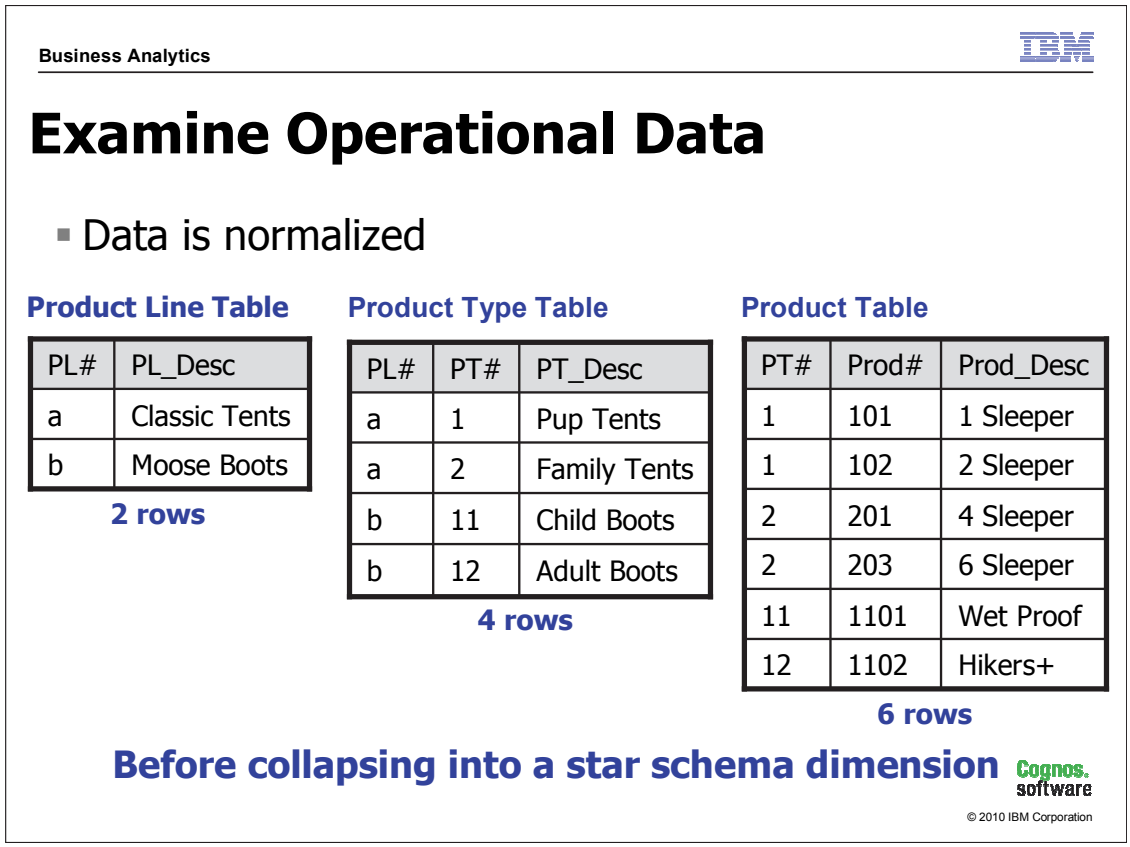
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Each table in a star schema database will contain an expanded set of data.

Extract Transform and Load (ETL) tools can be used to create a star schema data warehouse, or you may use a metadata modeling tool to emulate a star schema structure by generating the appropriate SQL at report design time. The second option will not improve performance, but will yield predictable results.

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The slide example shows three normalized tables that represent three hierarchical levels. Products roll up into product types, and product types roll up into product lines.

The Product Line table has two rows that indicate two lines of products sold by the company.

The Product Type table contains four rows to indicate the four types of products that fall under the previous two product lines (two types per product line).

The Product table contains the greatest level of detail. It holds 6 rows to represent the 6 products that fall under the four product types.

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Business Analytics

Examine Reporting Data

- Data is de-normalized

Product Dimension Table

PL#	PL_Desc	PT#	PT_Desc	Prod#	Prod_Desc
A	Classic Tents	1	Pup Tents	101	1 Sleeper
A	Classic Tents	1	Pup Tents	102	2 Sleeper
A	Classic Tents	2	Family Tents	201	4 Sleeper
A	Classic Tents	2	Family Tents	203	6 Sleeper
B	Moose Boots	11	Child Boots	1101	Wet Proof
B	Moose Boots	12	Adult Boots	1102	Hikers

6 rows

After collapsing into a star schema dimension

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The slide example shows a de-normalized dimension table created from the three normalized tables shown on the previous slide.

The Product Line table forms the first two columns of the new dimension table (PL# and PL_Desc), the Product Type table forms the next two columns (PT# and PT_Desc), and the Product table forms the last two columns (Prod# and Prod_Desc).

The main characteristic of this table is its redundancy. Note that each product line (Classic Tents and Moose Boots) is repeated, once for each product that the product line contains. The same applies for product type.

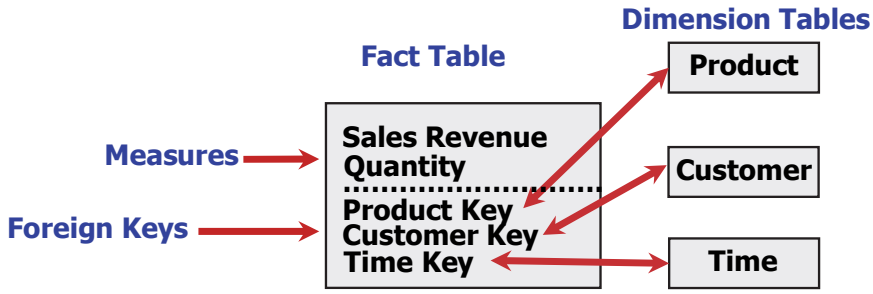
This type of table is unsuitable for a normalized system, but is ideal for a reporting and querying structure.

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Business Analytics

Examine Fact Tables

- Fact tables contain the (usually additive) values by which a company measures itself:
 - Standard Selling Price - not additive
 - Sale Amount - additive



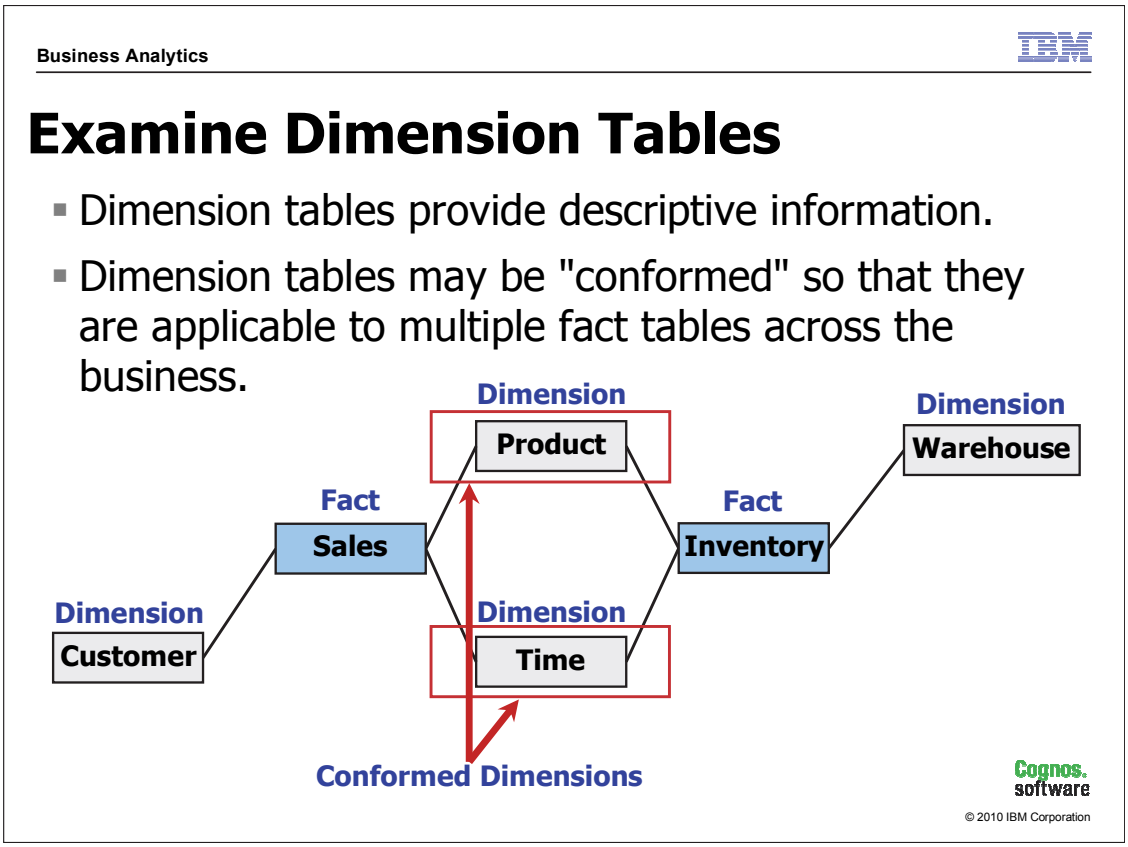
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Fact tables are the focal point of any star schema, and typically contain the most rows. There are typically no descriptive attributes in a fact table. Instead, there are foreign keys that relate to the dimension tables, which contain descriptive attributes.

Facts in a fact table are also known as metrics, measures, or key performance indicators. There are cases where you may encounter factless fact tables, in which only foreign keys are found. For example, in the case of a library, you may have a fact table that only contains a book key, a customer key, and a day key, which records which books were checked out by which customer and when.

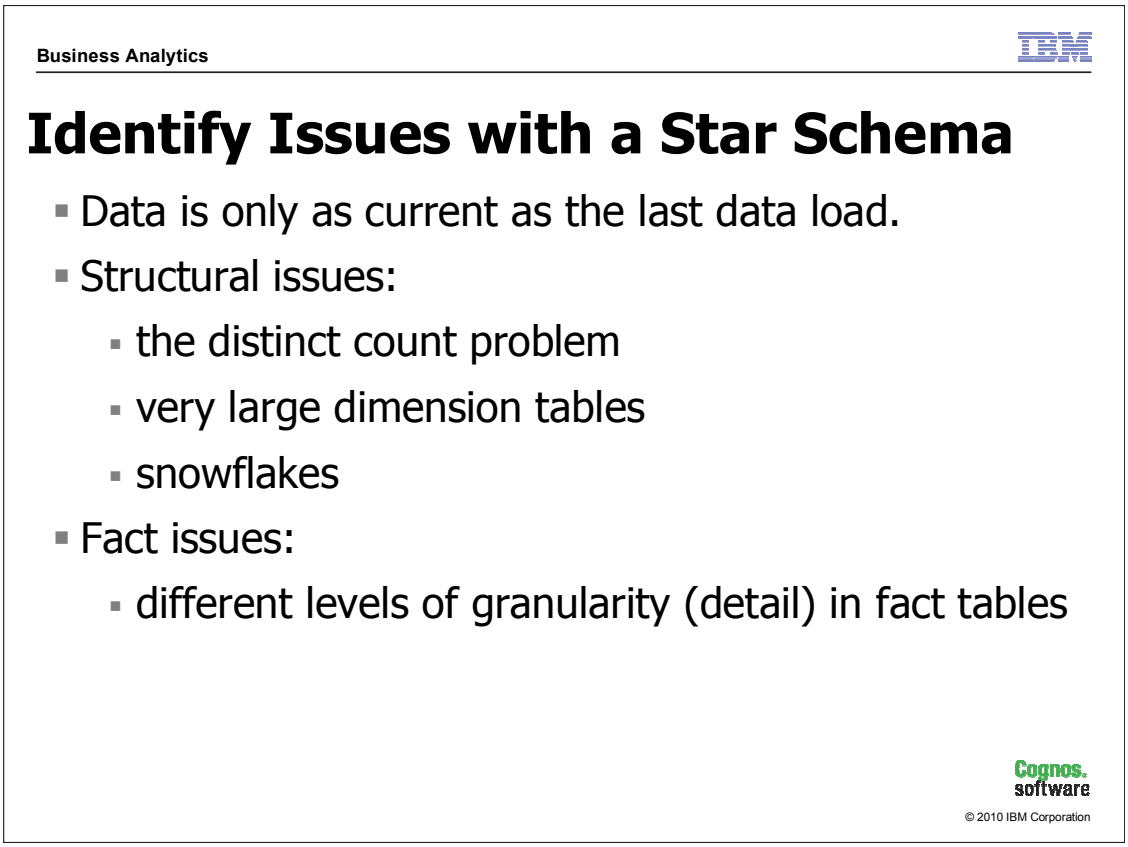
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Conformed dimensions prevent "islands of information" by providing context to multiple potential queries. A conformed dimension is one which is common to several fact tables; it has the same meaning and content when being referred to from several fact tables.

In the slide example, you can query either sales or inventory data through the Product dimension table, the Time dimension table, or both. For example, Product acts as a context when you want to compare quantity sold with stock count.

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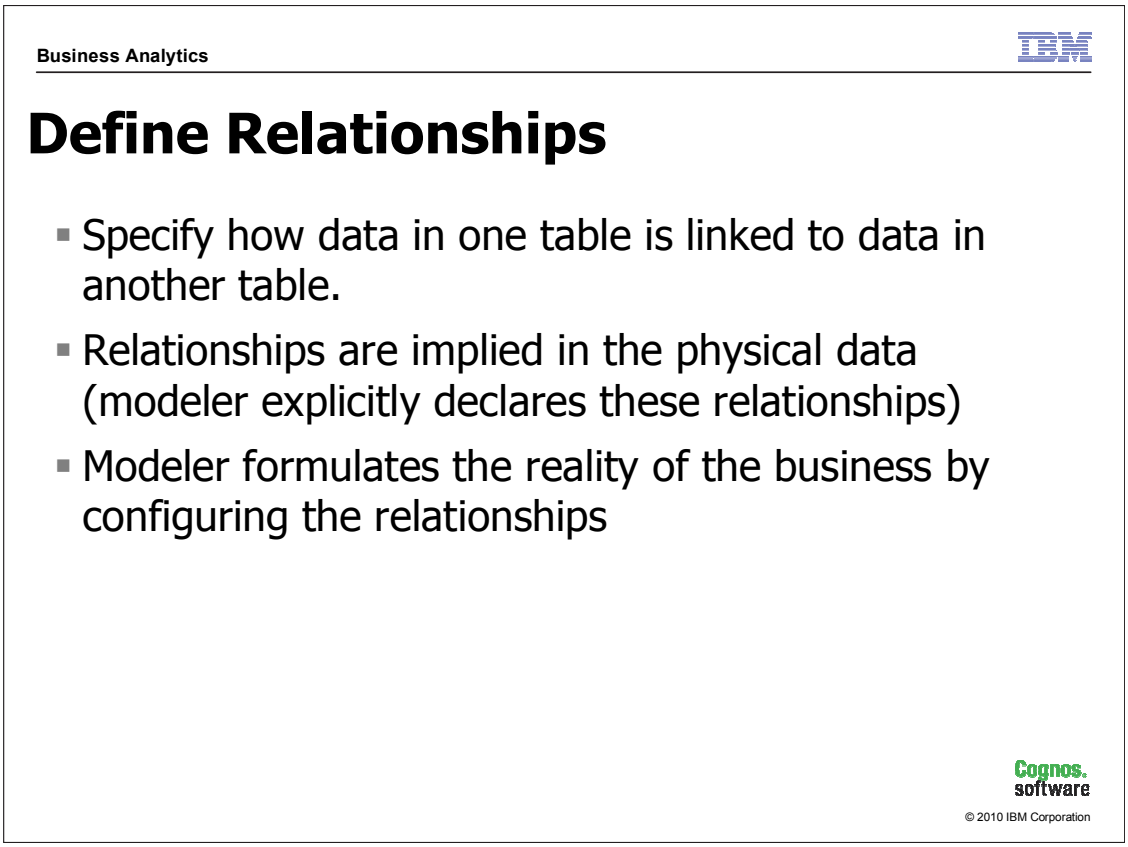
Unlike an operational database, the data is not live. Data is periodically loaded from an operational system into the reporting database (star schema layout). Therefore the data is only as current as the last time it was loaded.

When reporting against a star schema database, you may encounter difficulties in counting the exact number of items in the dimension, such as separate products.

The star schema may also include large dimension tables that result in reports that run too slowly. These tables may be broken out into smaller tables through a normalization process, which in turn creates snowflake tables.

In some cases, fact tables can have different levels of granularity. For example the data values may either be associated with the day level or the month level. The granularity may change based on the dimensions referenced in the fact table.

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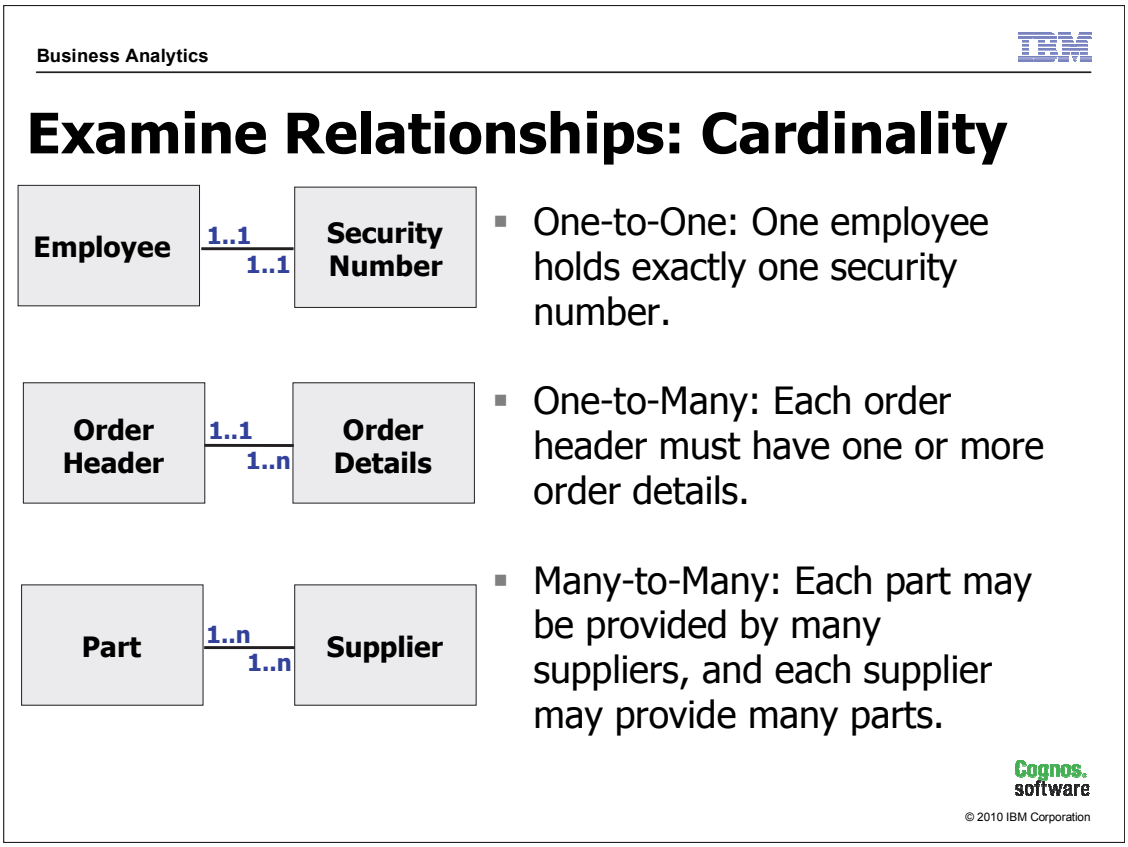
A relationship states a connection or an operational business rule, such as:

- a sales representative sells a product
- an employee is assigned to a department

Relationships work in both directions. You often have to examine both directions to fully understand the relationship. For example:

- a branch is composed of employees
- an employee may work directly for a branch

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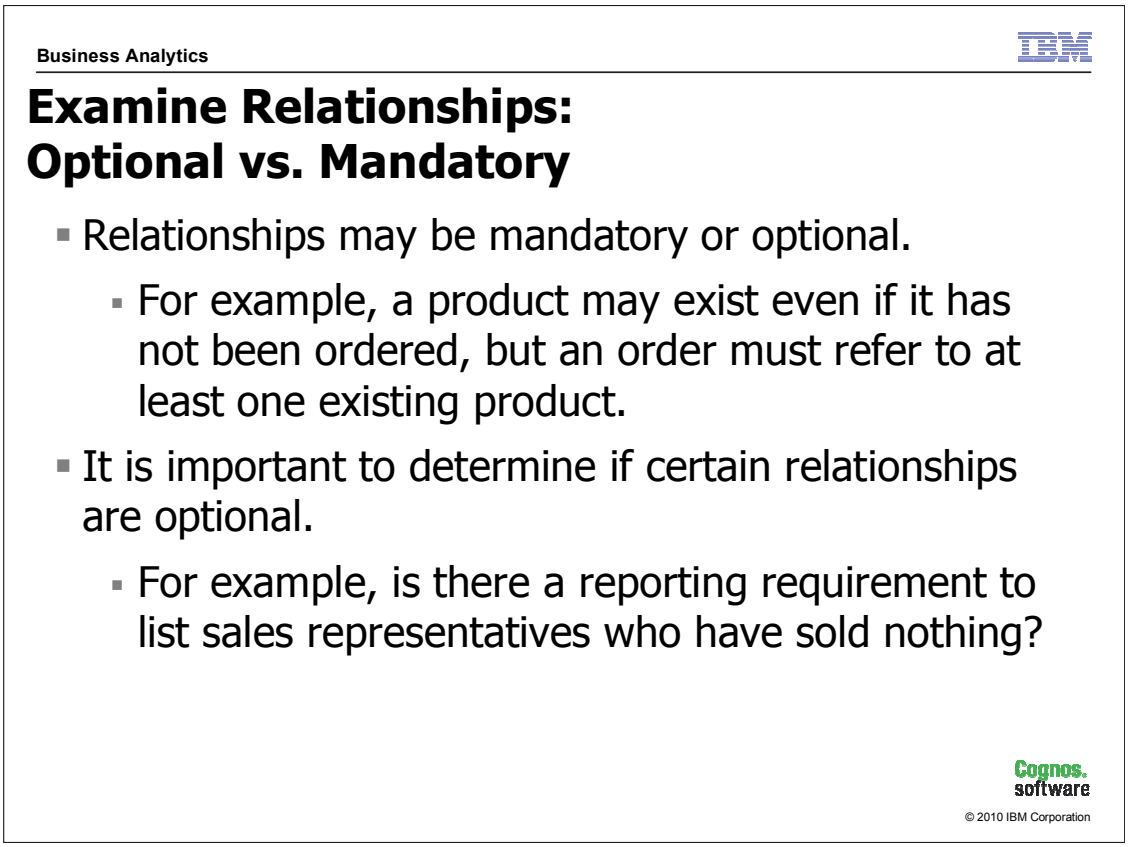
Cardinality indicates the number of instances of an entity in relation to another entity.

One-to-one relationships occur when one unique row in a table relates to exactly one row in another table. For example, each employee can only have one security number. One security number can only be associated with one employee.

One-to-many relationship example: an order is taken and an Order Header table is populated with data such as date, customer name, and sales staff name. This table is related to an Order Details table that contains data about individual items sold in that one order, such as order detail code, product number, and quantity. Therefore a relationship exists between Order Header and Order Details, whereby each Order Header must contain one or many Order Details, and each Order Detail must appear on one and only one Order Header.

Many-to-many relationships occur when many unique rows in a table relate to many rows in another table. The slide example shows that many suppliers may provide a single part. However, a single supplier may provide many parts.

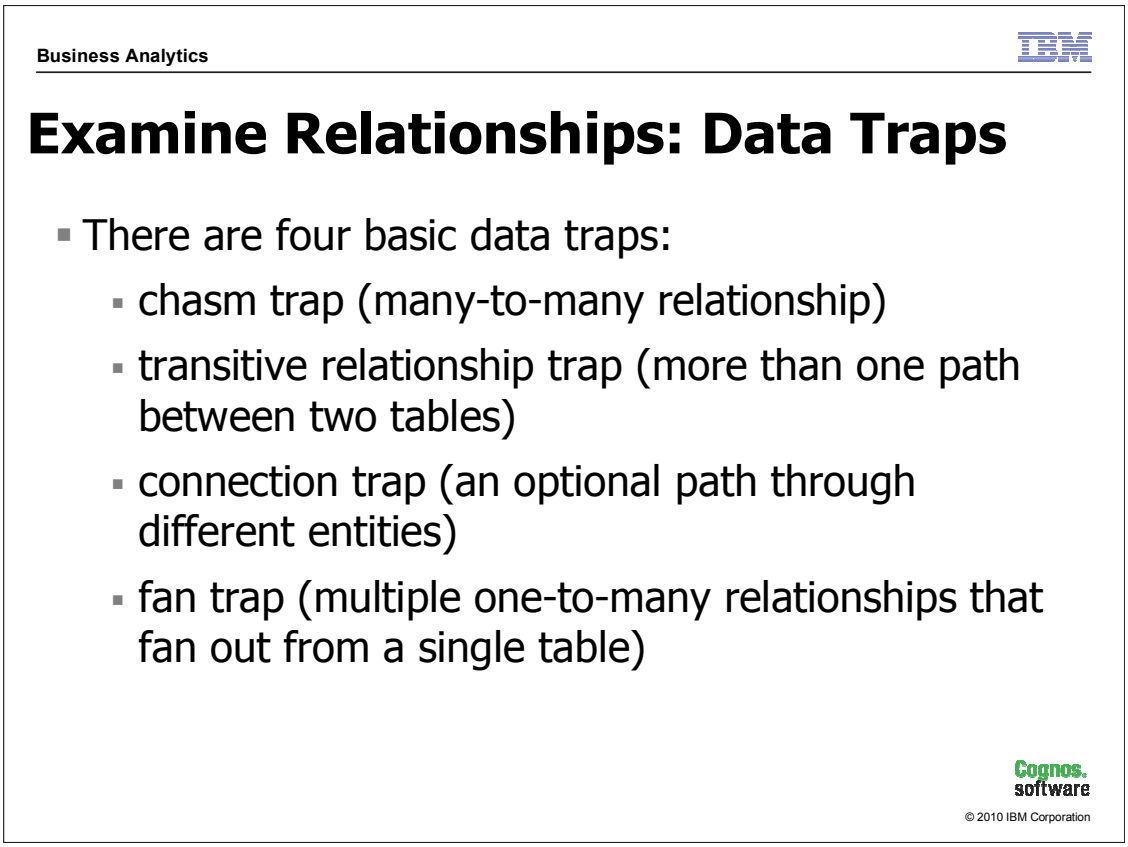
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A relationship is mandatory when a row of data in one table must exist in order for a row of data in another table to exist.

A relationship is optional when a row of data in one table does not have to exist in order for a row of data in another table to exist.

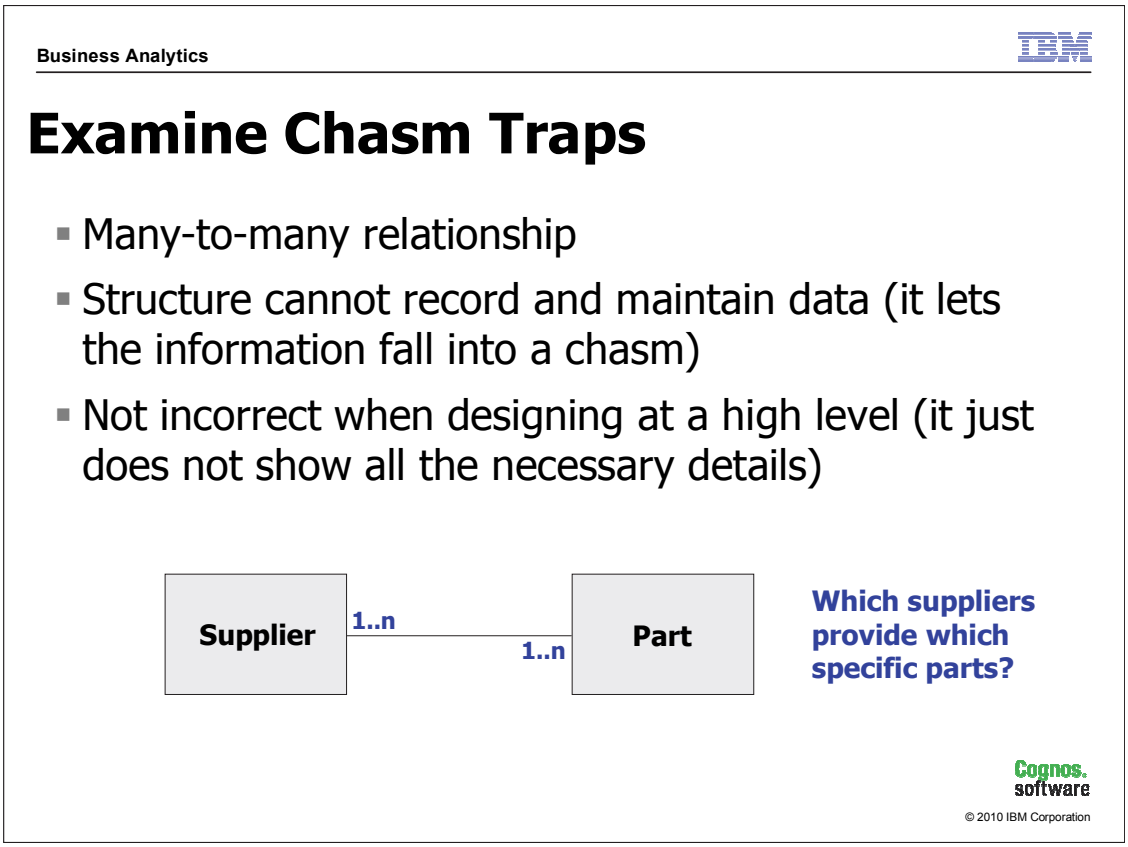
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A trap does not necessarily indicate a problem, only that an area is worth inspection and possible refinement.

The data modeler must carefully examine any area that does not appear to represent the data completely.

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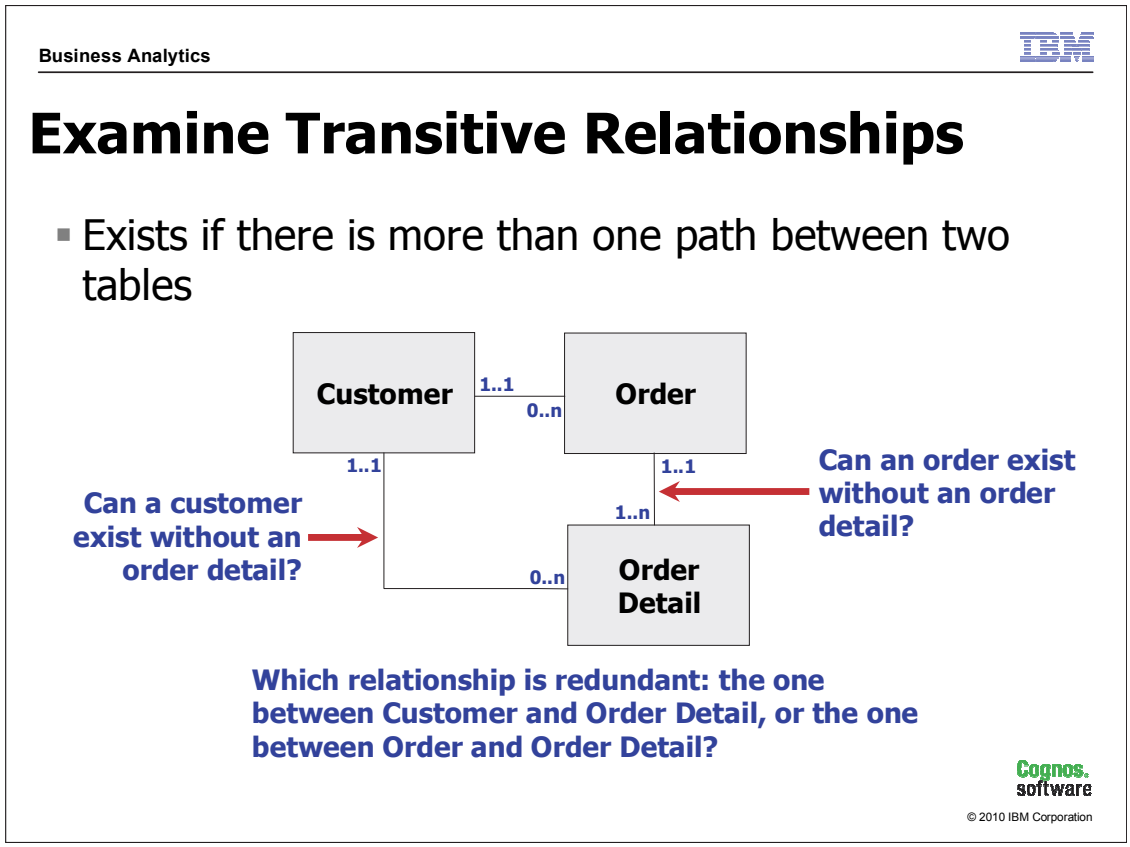
In a chasm trap, more than one row in a table is related to more than one row in another table.

The slide example shows that a single supplier may provide many parts, and many suppliers may provide a single part.

If each supplier can potentially supply every single part, how do you report on the suppliers that provide specific parts?

This is typically resolved with a "bridge" table that records the details of the relationship between the two tables.

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A transitive relationship trap resembles a wheel shape.

This kind of trap may make it difficult to write queries that retrieve the appropriate data, because it may not be clear which table columns must be included in the query.

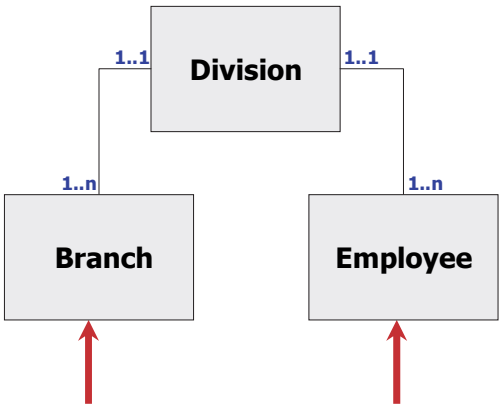
Going through either path produces some sort of result, but which path is the correct or more efficient one for your specific query?

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Examine Fan Traps

- Identified by multiple one-to-many relationships that fan out from a single table



Is there a direct relationship between Branch and Employee?

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Fan traps are also known as parallel relationships.

In this kind of trap, a table has two one-to-many relationships spreading out from it, implying that the two other tables have no connection to each other.

The modeler should examine such traps to determine whether a crucial relationship is missing.

Branch may actually have a direct relationship to Employee.

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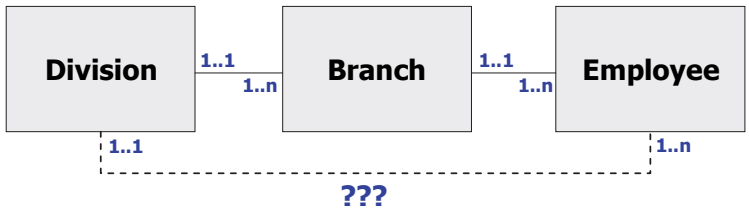
Business Analytics

Examine Connection Traps

- Is there an optional path through different entities?
- There must be a reliable path through all truly related entities

What is the relationship between Branch and Employee?

If an employee does not work for a branch, do they work for a division?



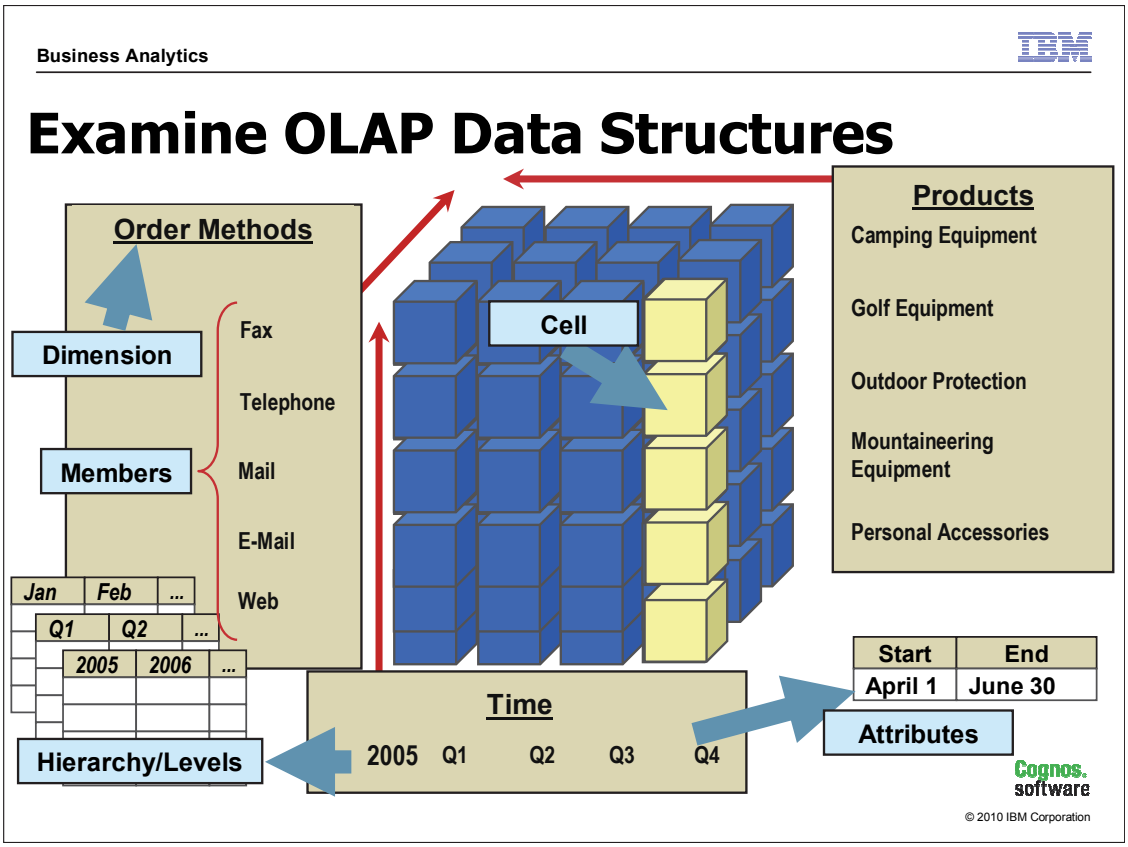
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The slide example suggests that there may be a direct relationship between the Employee and Division tables.

An employee may be able to work directly for a division, instead of working for a branch within a division. For example, the employee may work from a home office.

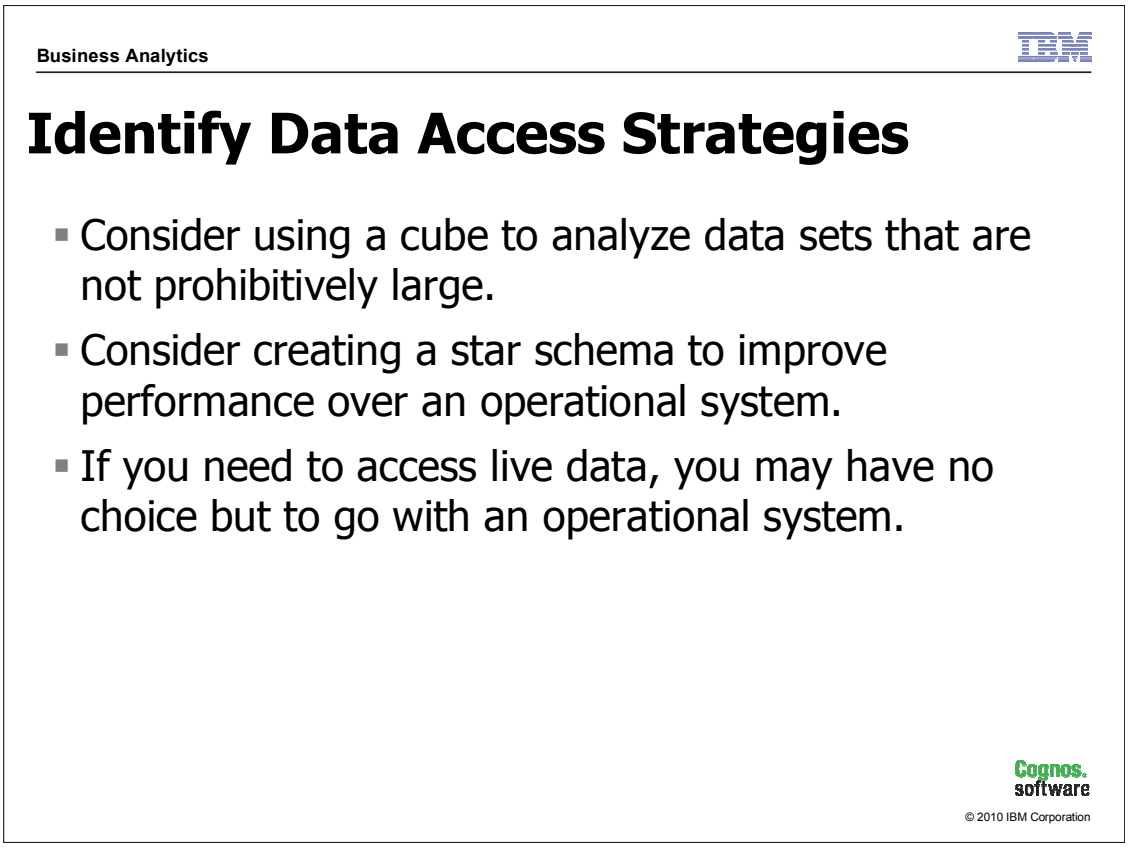
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The OLAP structure consists of the following elements:

- **dimensions** - contain members, which may be structured into hierarchies and levels
- **hierarchies** - provide context to the level structures they contain
- **levels** - provide structure for the members of a hierarchy
- **members** - data entities that provide context to cell values
- **attributes** - provide additional information about members
- **cells** - are intersection points containing values (measures) for various members from different dimensions (also referred to as tuples)

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The methods that you use to access your data for reporting purposes will be determined by your needs and by the structure and content of the data itself.

What are acceptable performance times for your reports? If the information is required quickly (within seconds), consider using cubes. However, if the data set is extremely large, cubes may not be the solution and you may want to consider using a data mart or warehouse with pre-aggregated tables.

If you require live data, you may need to go directly against your operational system. Remember that reporting directly against a normalized operational system may yield poor performance and may slow down the writing of data to the database.

Planning and scope should be given a great deal of attention before embarking on a business intelligence project.

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Summary

- You should now be able to :
 - examine the characteristics of operational databases and databases designed for reporting
 - examine relationships and cardinality
 - identify different data traps
 - examine OLAP data sources

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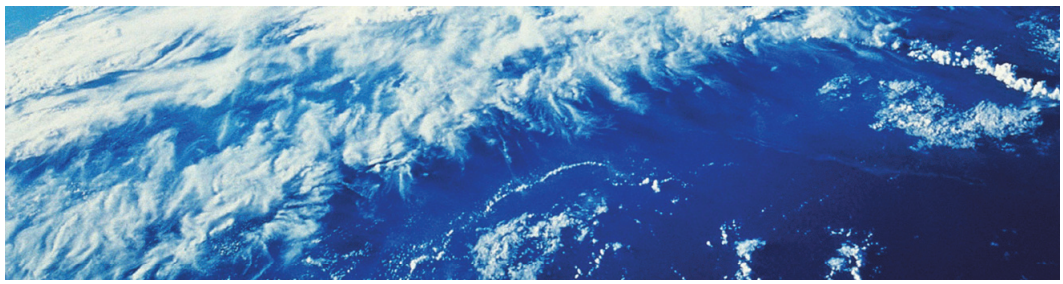
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Gather Requirements

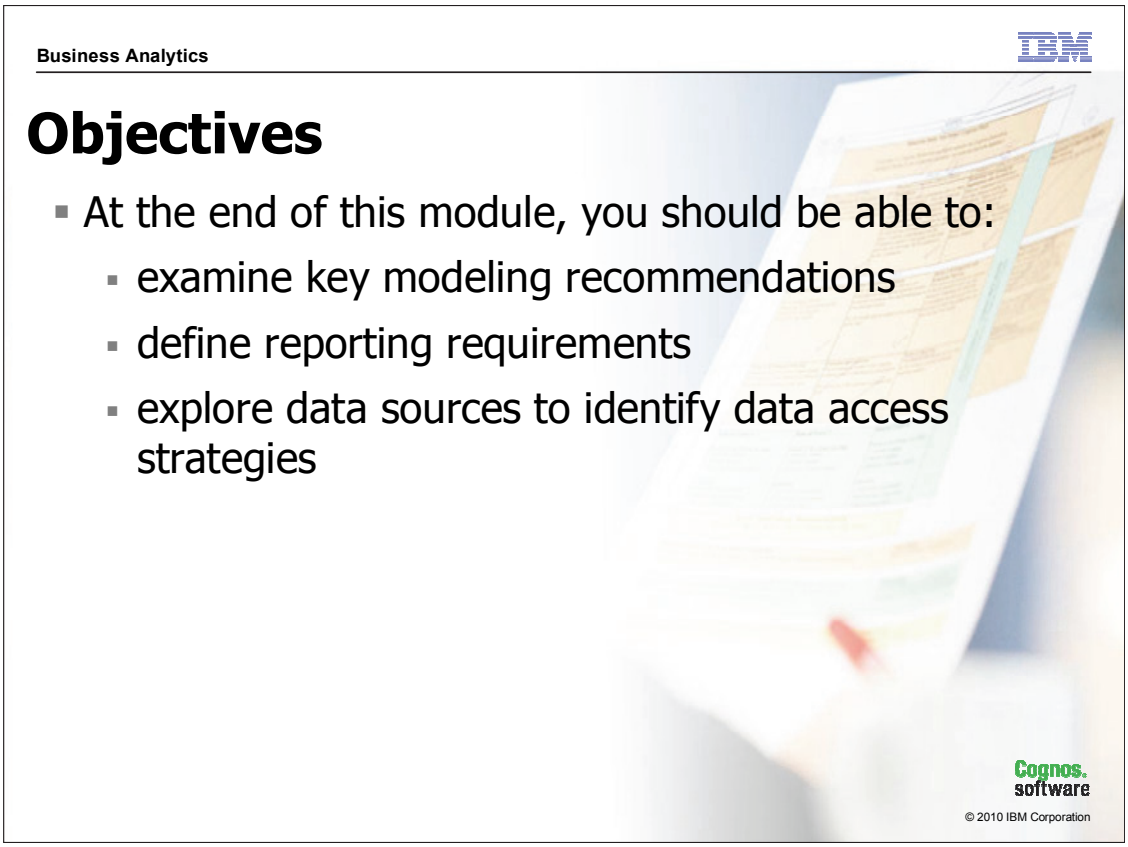
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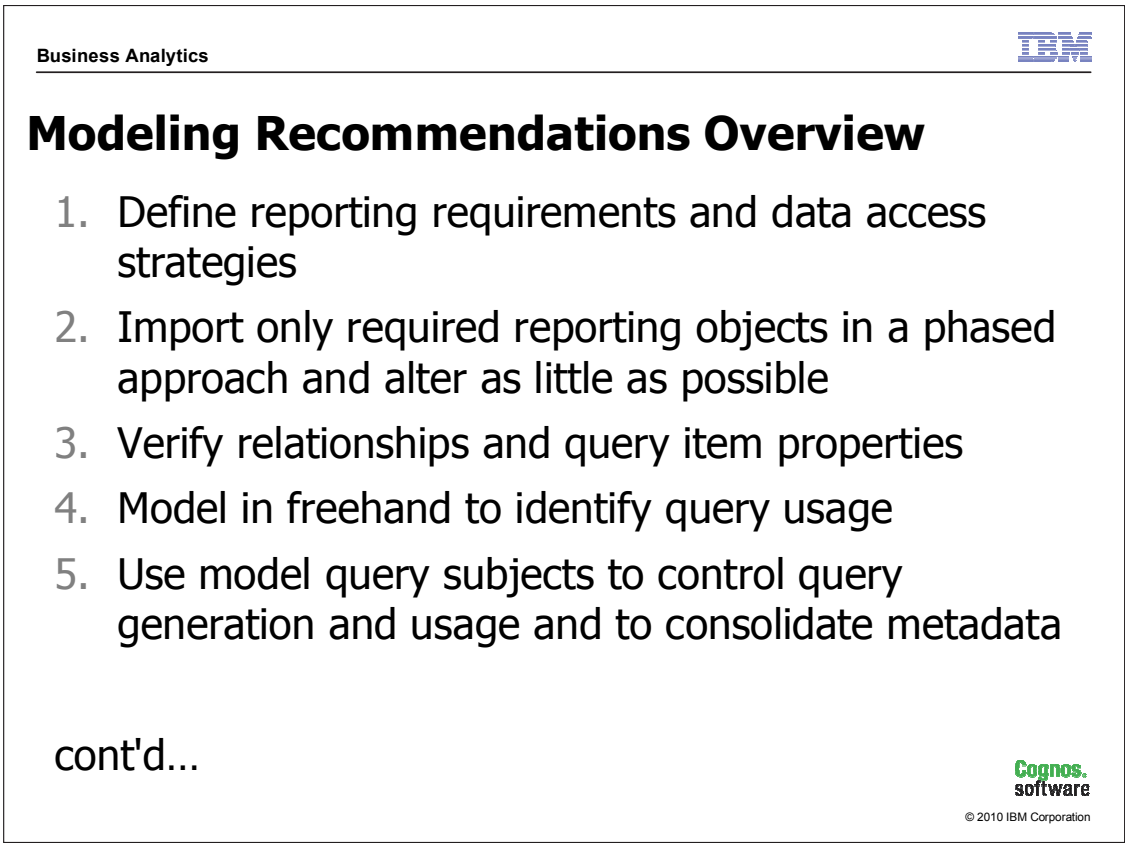
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These recommendations will be expanded upon as you progress through the course.

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Business Analytics

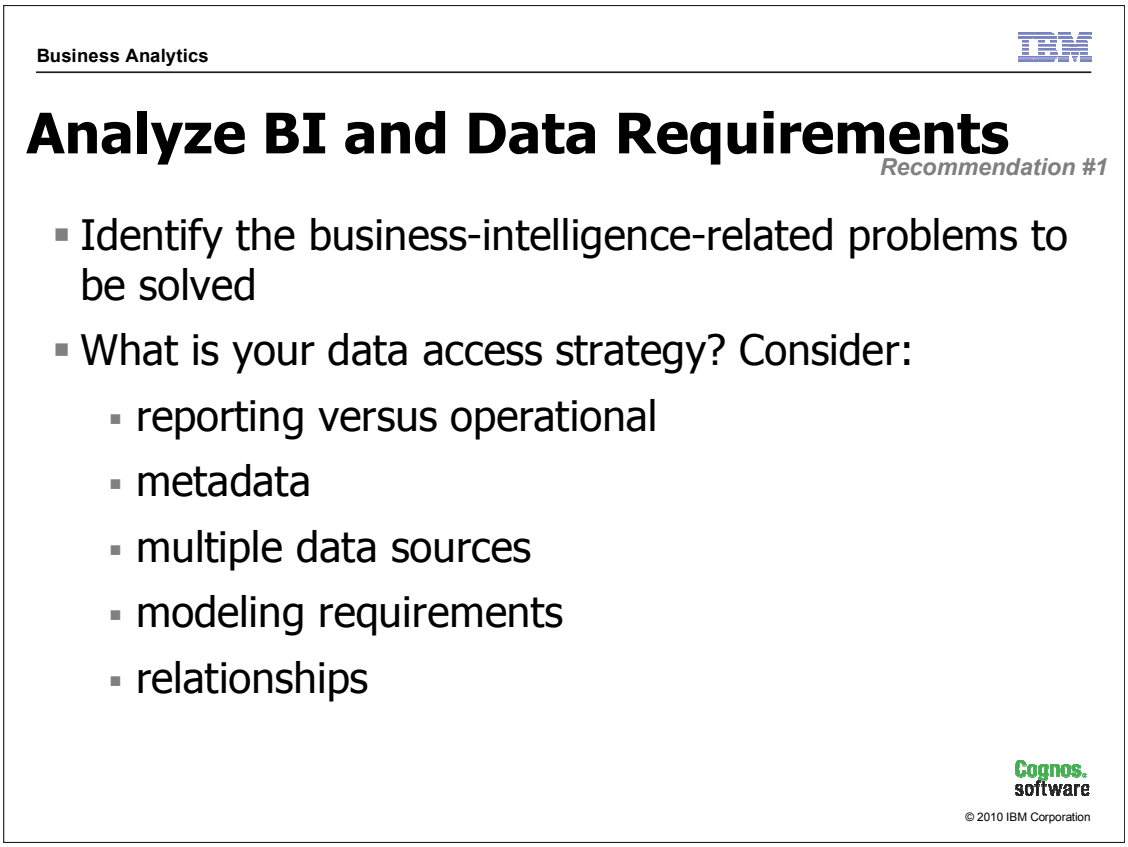
Modeling Recommendations Overview (cont'd)

6. Customize metadata for run time
7. Specify determinants as required
8. Resolve multiple ambiguous joins between query subjects
9. Create analysis objects if OLAP-style querying is required
10. Create the business view as a set of star schema groupings

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Problems to be solved include setting the scope of your project and setting its methodology, as well as multilingualism, performance, security, and presentation.

Do you and the IBM Cognos users agree on the model requirements?

Does the data source contain the data and metadata you need?

Does the same data exist in more than one source?

Which data source tables are the fact tables, which are the dimensions, and which are both fact tables and dimensions? What are the keys and attributes of each dimension?

Do fact tables contain only facts and foreign keys? Do they also contain dimensional attributes that should be in dimension tables?

What are the required relationships and are there multiple paths between tables?

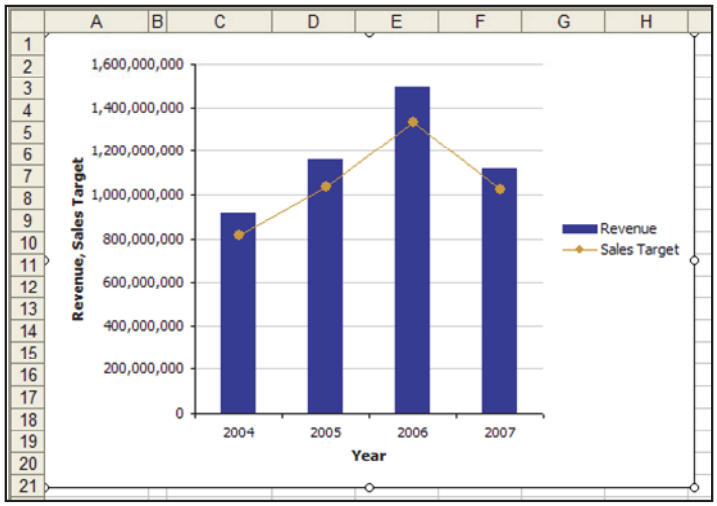
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Business Analytics

Interview and View Samples

Recommendation #1

- Interview authors and users to determine needs
- View reports that IBM Cognos will be replacing

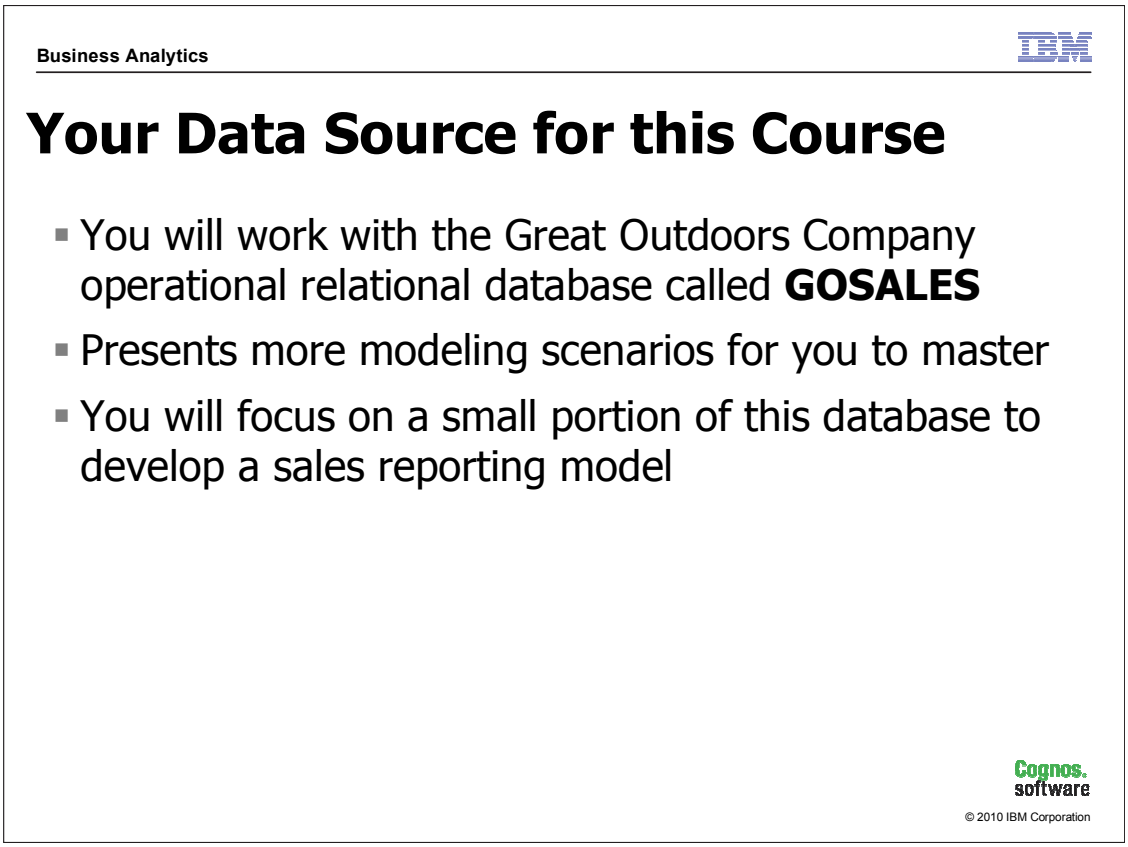


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Ralph Kimball (author on the subject of data warehousing and business intelligence) recommends an interview-based approach to determine report requirements. The focus is on what information the key business decision makers require to do their jobs. This will result in a framework of key performance indicators (KPI) and business contexts.

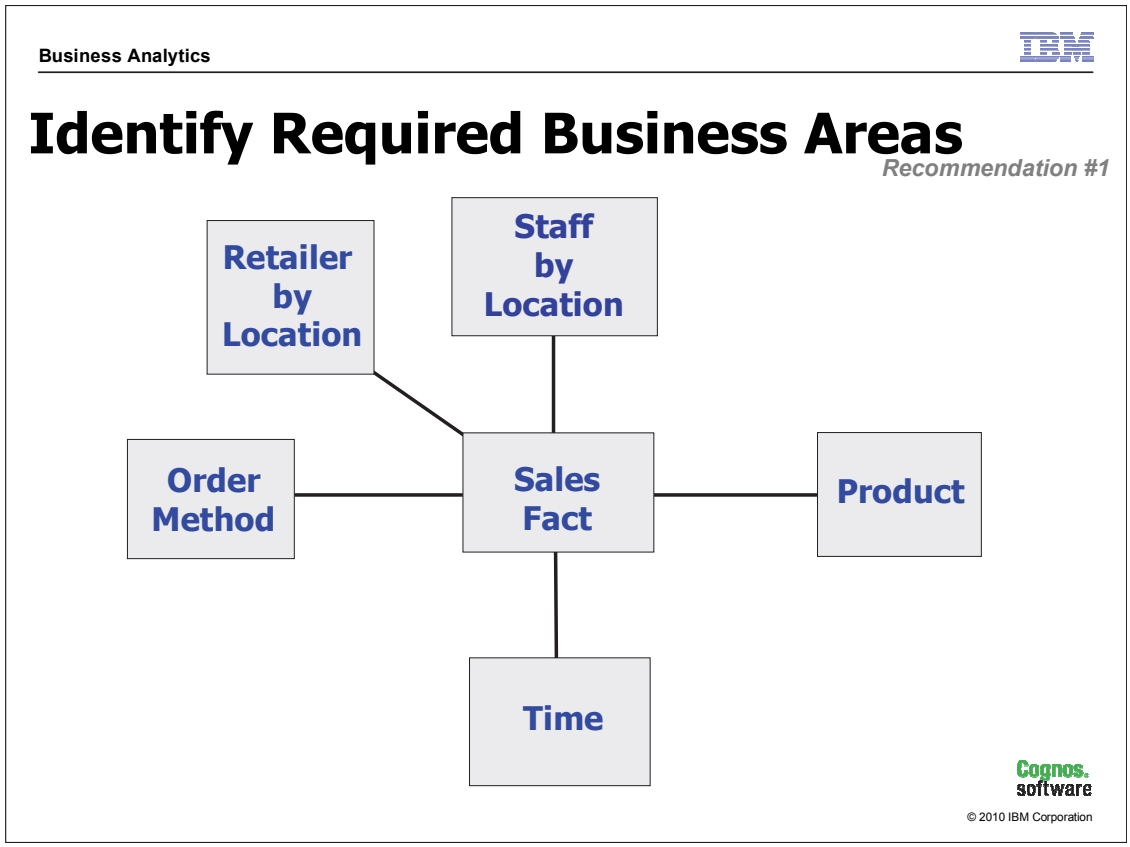
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This course will use the Great Outdoors Company operational database called GOSALES in order to build a sales reporting model.

Although a reporting (star schema) database is recommended for performance and ease of use, in this course you will model an operational system to provide you with a wider variety of modeling techniques and prepare you for more data scenarios back at your place of work.

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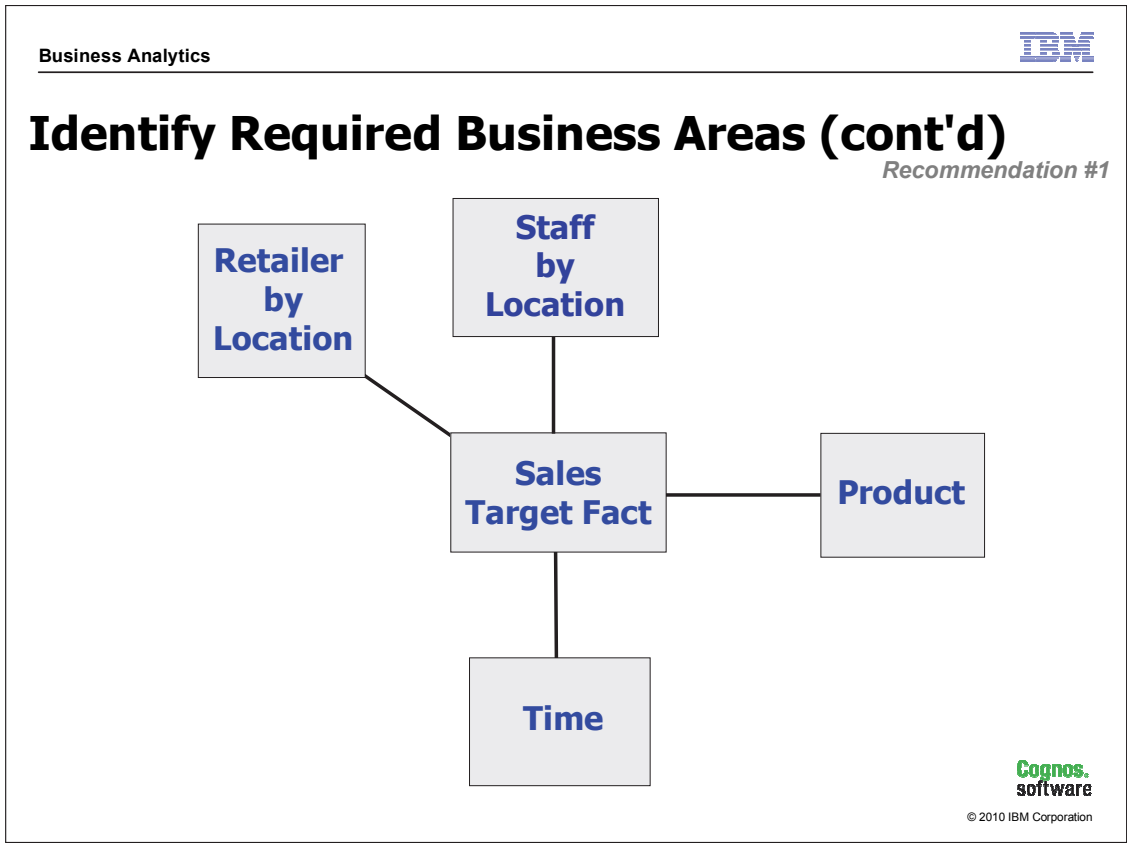


Before creating a Framework Manager project, you must:

- analyze and understand your reporting requirements based on the business process that authors will be reporting on
- understand your data and the structure of your data source(s)

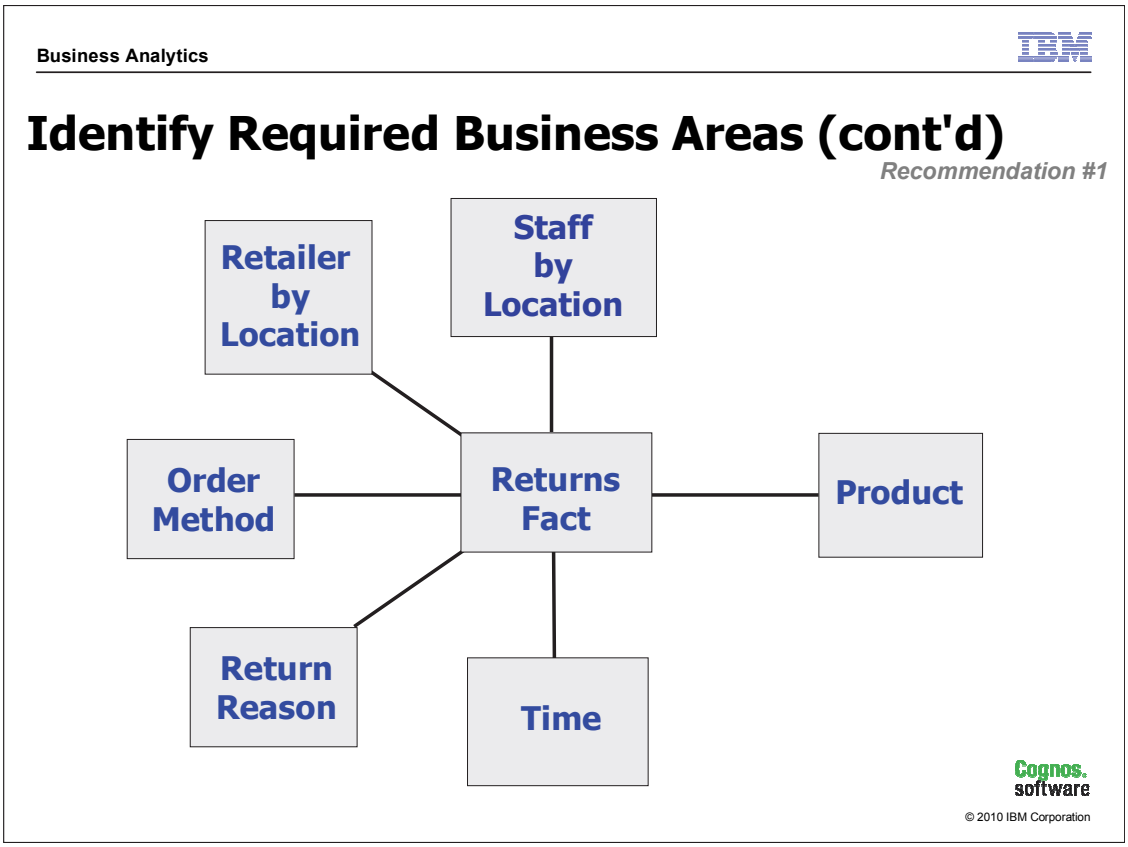
Upon interviewing BI users, you discover that they would like to report on sales data by the dimensions shown in the slide example above.

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BI users would also like to report on sales targets by the dimensions shown above.

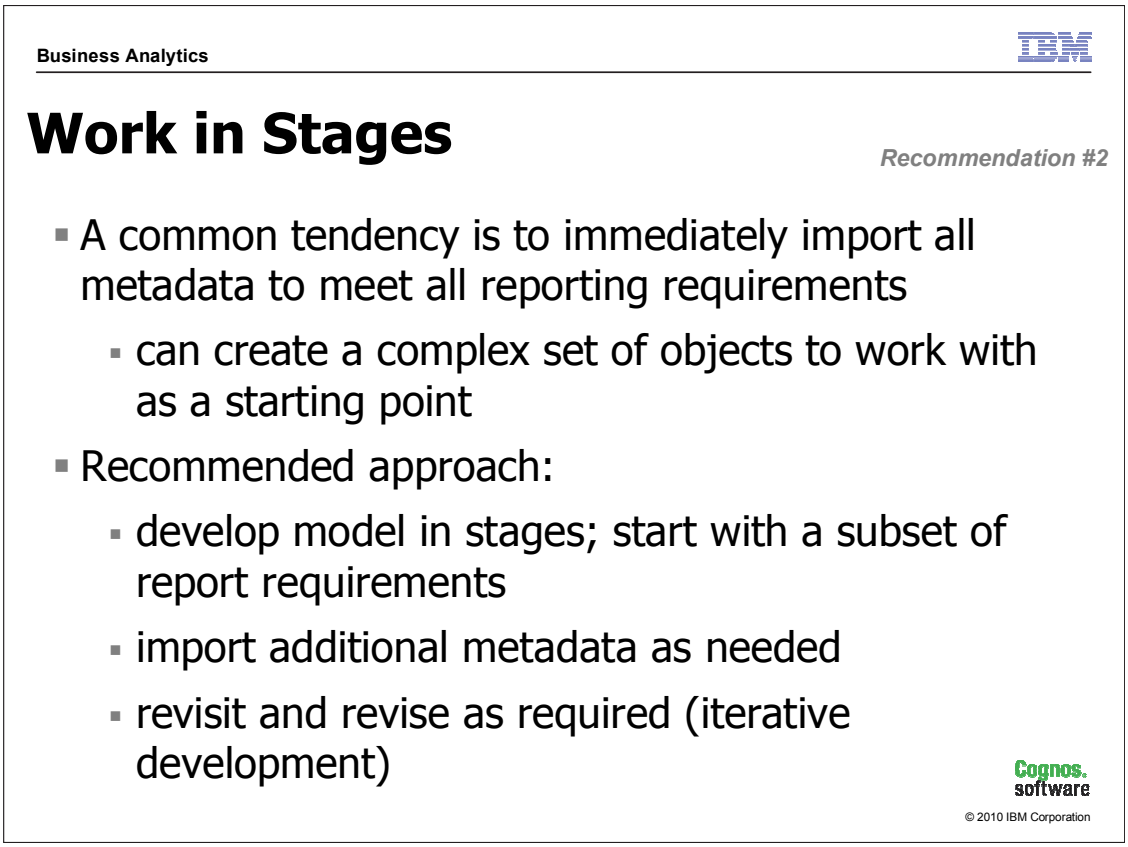
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And finally, BI users would like to report on returns by the dimensions shown above.

Knowing this information, you interview the database administrator to find out where this information can be obtained. You are told it is in the GOSALES database.

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For your course model, the scenario is that you have interviewed functional users and have determined that you will start with a baseline project that allows reporting on sales by product or by order method. This postpones work on sales staff, location, retailer (your customers), sales targets, and returns.

As you progress in your modeling activities, you may discover other requirements or the data itself may present you with other reporting options that were not thought of by the end users.

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Demo 1: Identify Data Sources (Instructor-only)

Purpose:
As the Data Modeler for The Great Outdoors Company, your task is to develop a model that supports the business requirements of report and ad hoc query authors working with Cognos. Before you begin the modeling process, you will locate the data sources identified as necessary to meet those reporting requirements.

Component: **IBM DB2 Control Center**

Task 1. Open DB2 Control Center.

1. From the **Start** menu, point to **All Programs** > **IBM DB2** > **DB2COPY** > **General Administration Tools**, and then click **Control Center**.
2. In the Control Center View dialog, select the **Basic** radio button.
3. Click **OK**, expand **All Databases** > **GS_DB**, and then click the **Tables** folder.

Task 2. Investigate Tables.

The sales reports will be focused on orders, so note the ORDER_DETAILS, ORDER_HEADER, and ORDER_METHOD tables.

1. Click **ORDER_HEADER** to view details for the ORDER_HEADER table in the Details pane.

 You can identify the tables related to the ORDER_HEADER header table by looking for foreign keys. Here you can see several keys: ORDER_NUMBER, RETAILER_SITE_CODE, RETAILER_CONTACT_CODE, SALES_STAFF_CODE, SALES_BRANCH_CODE, and ORDER_METHOD_CODE. You will now examine some of these relationships.

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2. Click **ORDER_DETAILS** to view details for the ORDER_DETAILS table in the Details pane.

 You can see the facts needed for many reports: QUANTITY, UNIT_COST, UNIT_PRICE, and UNIT_SALE_PRICE. You also see ORDER_NUMBER, confirming the relationship to ORDER_DETAILS. You also see PRODUCT_NUMBER. You will confirm that this is the link to the Product data.

3. Scroll down the list of tables to the **PRODUCT** table.

 You can see a series of tables whose names start with PRODUCT_, so you will have to view each one to decide if they contain data that meets the reporting requirements.

4. Click **PRODUCT** to view details for the PRODUCT table in the Details pane.

 You see PRODUCT_NUMBER, confirming that this is the link to the sales (ORDER_DETAIL) data. Upon asking the database administrator about BASE_PRODUCT_NUMBER, you learn that this is for handling multiple brands of a given product. You see several codes, indicating foreign keys to PRODUCT_TYPE, PRODUCT_COLOR, PRODUCT_SIZE, and PRODUCT_BRAND. You also see the product facts you were looking for to report on: PRODUCTION_COST and GROSS_MARGIN. However you don't see a product name or description field. You will have to keep looking.

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5. Click **PRODUCT_TYPE** to view details for the PRODUCT_TYPE table in the Details pane.

 You see PRODUCT_TYPE_CODE, confirming the link to PRODUCT. You also see PRODUCT_LINE_CODE (which you can confirm links to PRODUCT_LINE in a three-level hierarchy; product line>product type>product).

 Note the many PRODUCT_TYPE_xx columns. This is one form of multilingual support, a column for each language. Later in the course, you will see how you can modify the metadata so that authors and consumers can access a single product type column, which will automatically return the appropriate language based on the user's regional settings. Recall that you did not see such a list of columns for the name of the product itself in PRODUCT, so that table must have a different form of multilingual support.

6. Click **PRODUCT_NAME_LOOKUP** to view details for the PRODUCT_NAME_LOOKUP table in the Details pane.

 Now you see PRODUCT_NAME and PRODUCT_DESCRIPTION as well as PRODUCT_LANGUAGE, and you can conclude that this table must have multiple language records for each PRODUCT_NUMBER.

 The only outstanding report item required before beginning a baseline project is an order method. Recall that ORDER_HEADER holds an ORDER_METHOD_CODE column.

7. Click **ORDER_METHOD**.

 You see the order method columns; one for each supported language in the data. You will need to resolve this multilingual challenge in the same manner you will use for PRODUCT_TYPE_xx.

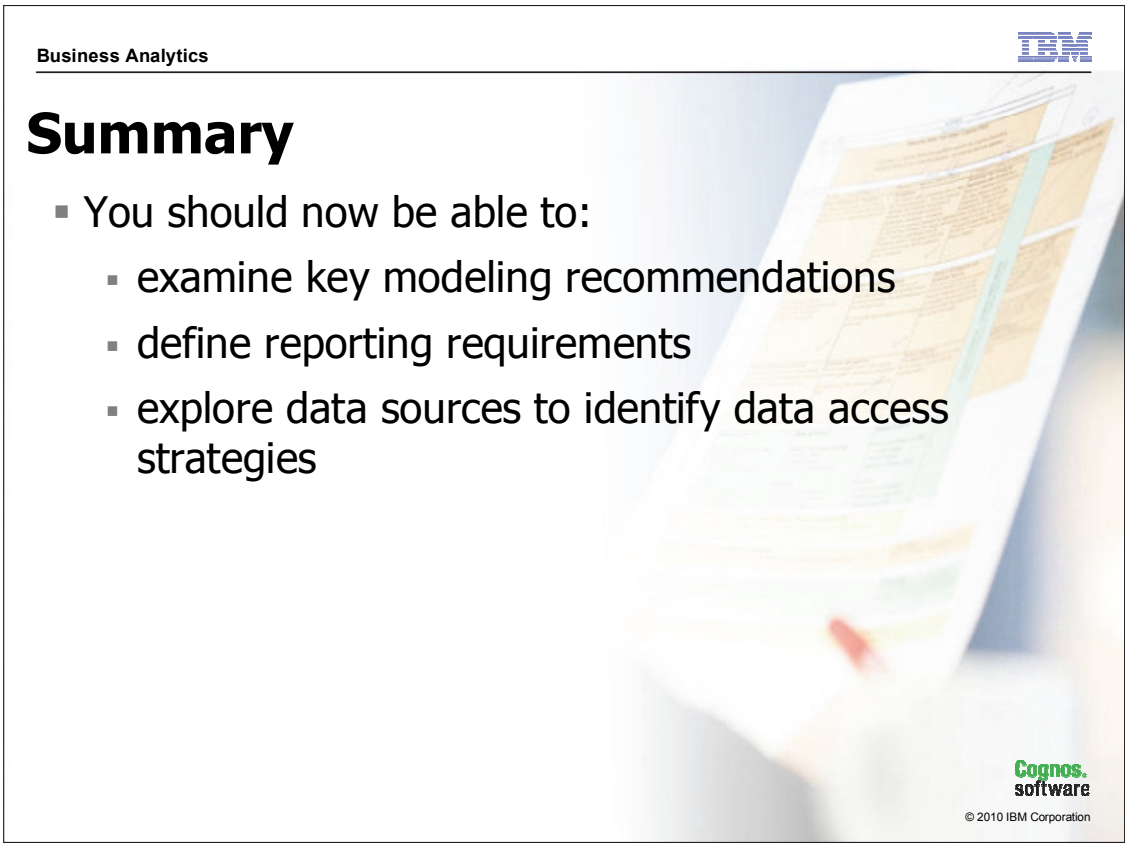
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8. Close **Control Center**.

Results:
You have identified the following tables as those needed for the first phase of your model building, a baseline project.
- ORDER_HEADER, ORDER_DETAILS, ORDER_METHOD
- PRODUCT, PRODUCT_TYPE, PRODUCT_LINE, PRODUCT_NAME_LOOKUP

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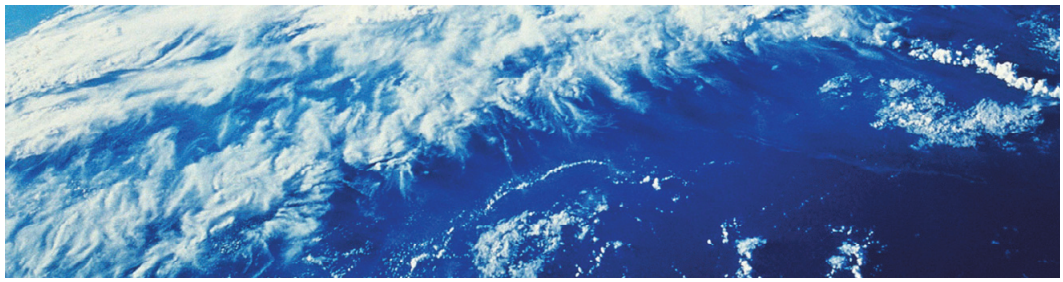


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Create a Baseline Project

IBM Cognos BI



Business Analytics

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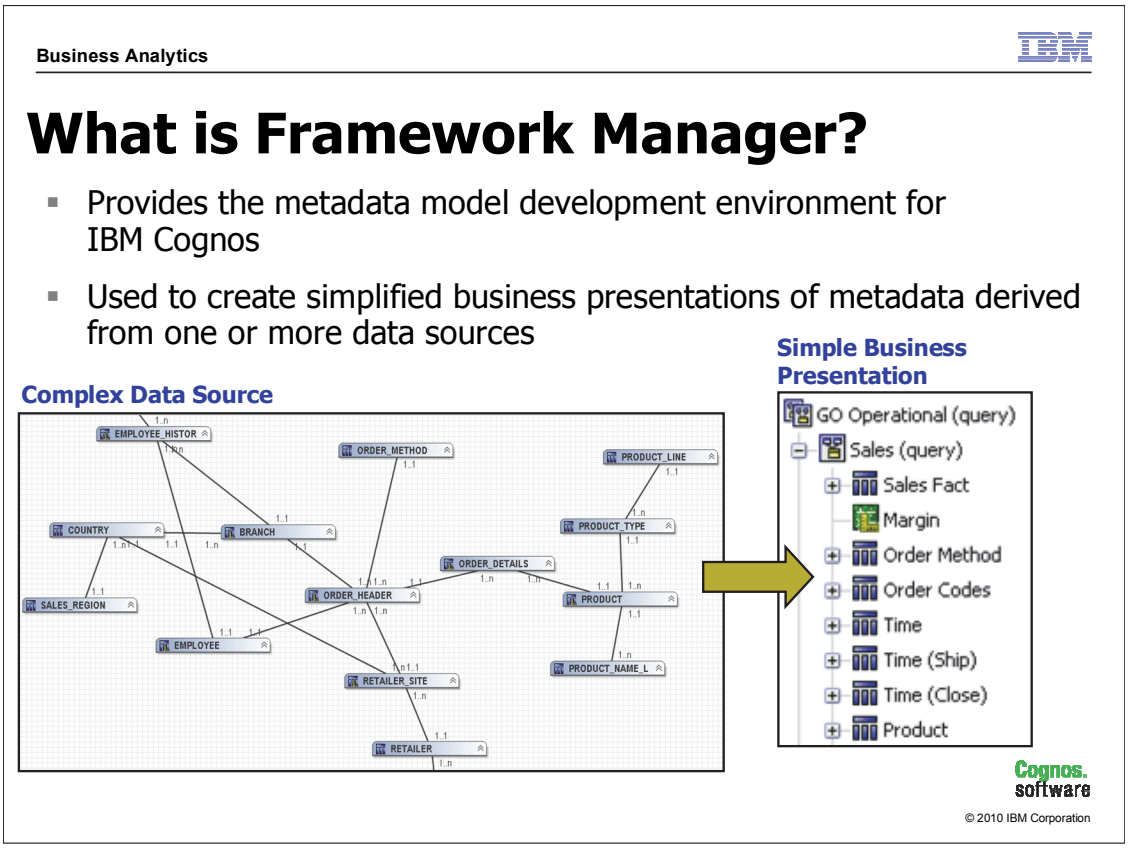
Objectives

- At the end of this module, you should be able to:
 - follow the IBM Cognos and Framework Manager workflow processes
 - define a project and its structure
 - describe the Framework Manager environment
 - create a baseline project
 - enhance the model with additional metadata

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When you work in Framework Manager, you work in a project. A project contains metadata objects (the model) organized for report authors according to the business model and rules.

The modeler's job is to take the complexity of the underlying data structures and create simplified presentations for authors and business analysts that provide predictable results. These simplified views are then published as packages to the IBM Cognos Connection for use in the BI studios.

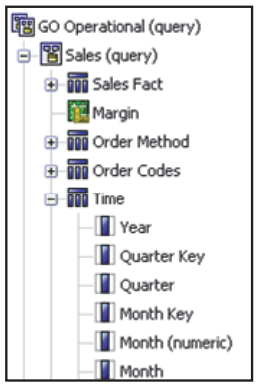
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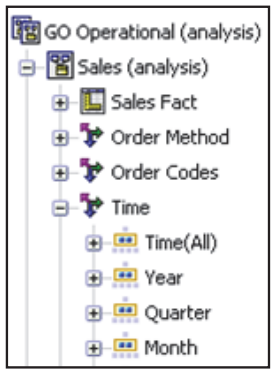
What is Framework Manager? (cont'd)

- Can create two model types:
 - relational for reporting
 - dimensionally modeled relational (DMR) for OLAP-style analysis and reporting

Relational Model



Dimensional Model



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Relational models consist of query subjects and within those, query items.

DMR models consist of dimensional information provided by the modeler, such as hierarchies and levels, to allow authors to perform OLAP-style queries.

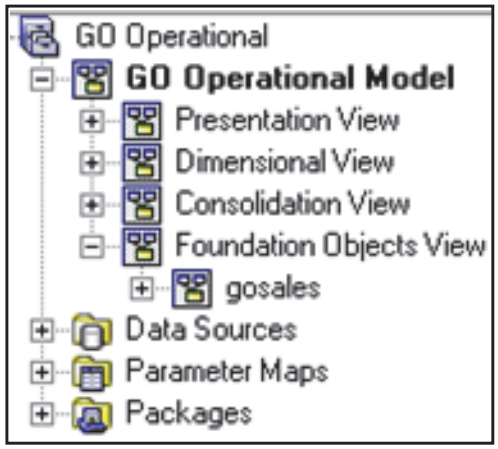
These two model types can be developed in the same project and published as separate packages. In the slide example, the packages are GO Operational (query) and GO Operational (analysis), both published from the same project.

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Define a Framework Manager Project

- At the highest level, objects in a project include:
 - a model organized into namespaces and folders
 - data sources
 - parameter maps
 - packages



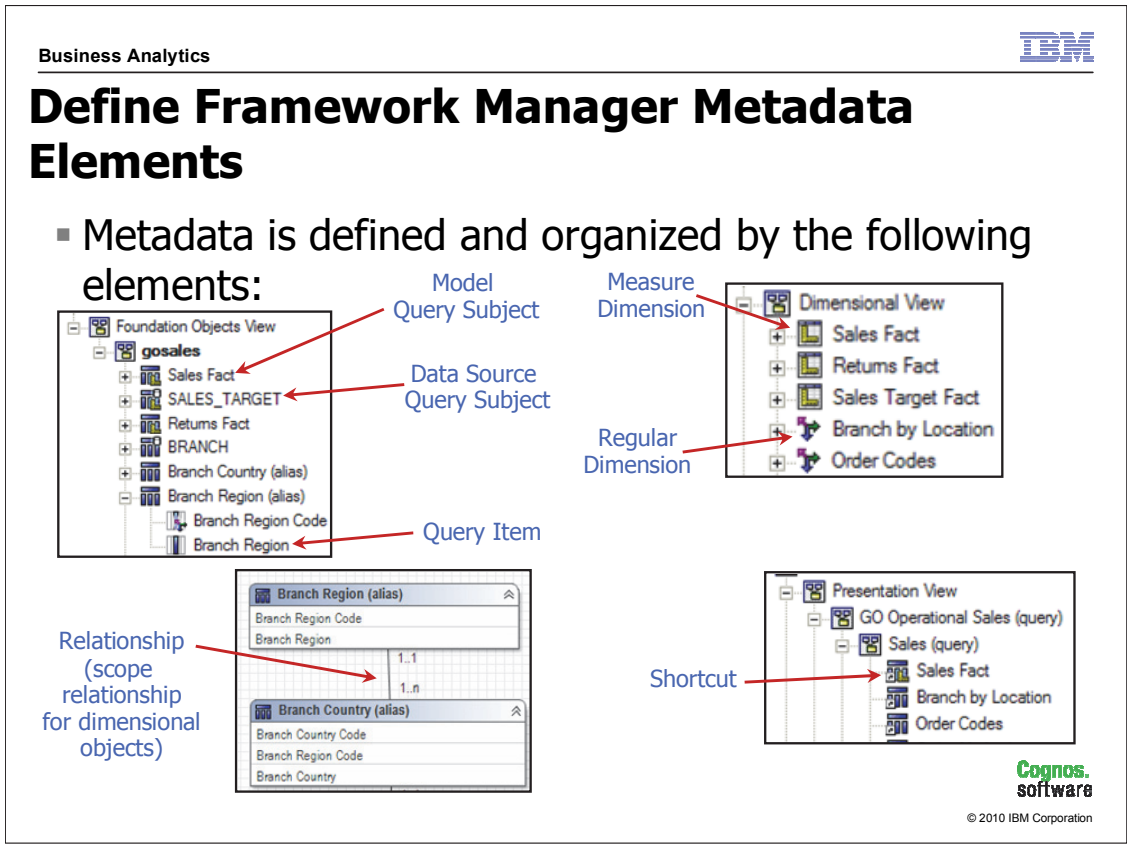
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The system files of a project consist of a folder containing a project file (.cpf) and a set of XML files specific to that project. These files should be backed up or checked into a repository control system regularly to prevent data loss. A project contains the following objects:

- Model - the set of metadata objects organized and modeled for report authors. The root of the model is a namespace that can contain other namespaces and folders, which are containers for organizing objects; however the names of objects in a namespace are qualified with the namespace name to uniquely identify them. This allows you to have objects of the same name in different namespaces.
- Data sources - information IBM Cognos uses to connect to data sources
- parameter maps (optional) - a list allowing the substitution of one value for another at run time
- Package - a subset of the project objects that is published to IBM Cognos Connection for use by authors and business analysts.

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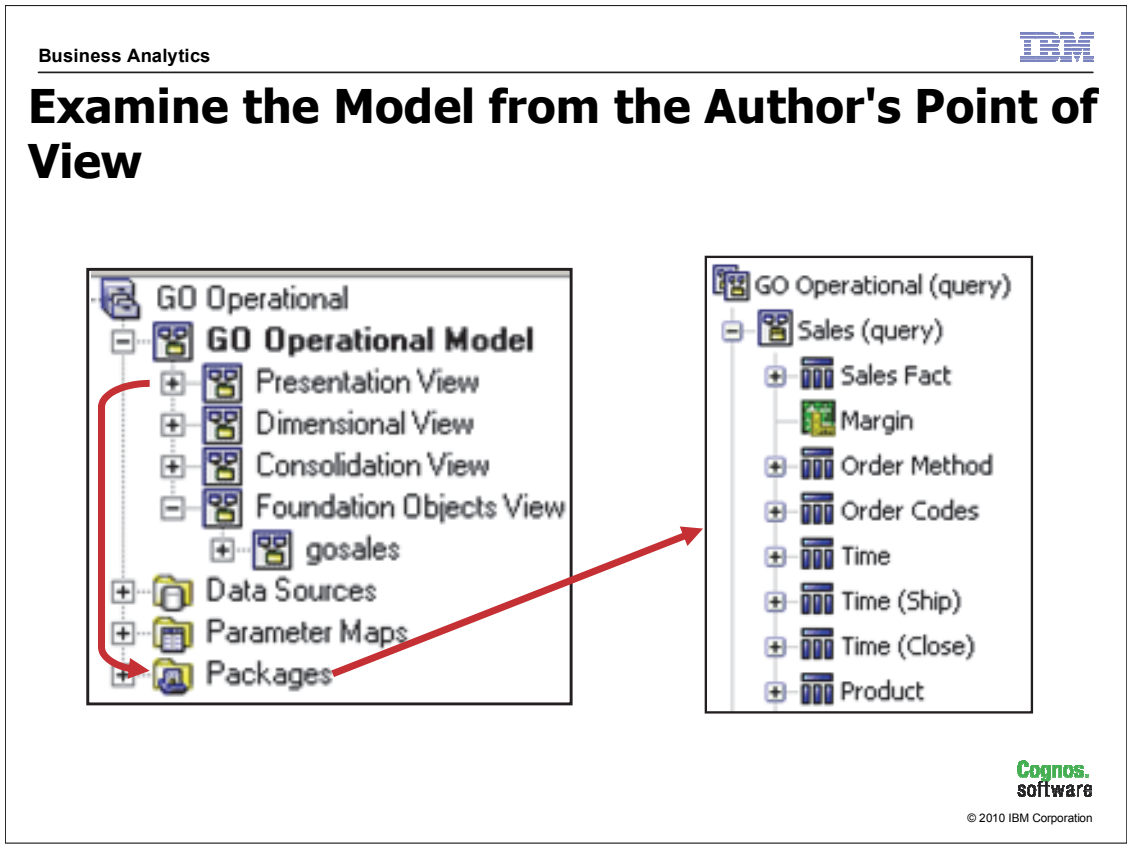
In Framework Manager, you will interact with the following objects:

- query subject - there are three types:
 - data source: maps to a corresponding object in the data source and uses a modifiable SQL statement to retrieve the data
 - model: maps to existing metadata in the model
 - stored procedure: executes a database stored procedure to retrieve or update the data

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- query item - contained within a query subject and maps to a corresponding object in the data source
- relationship - connection that explains how the data in one query subject relates to the data in another
- regular dimension - contains descriptive and business key information and organizes the information in a hierarchy, from the highest level of granularity to the lowest allowing for OLAP-style queries
- measure dimension - a collection of facts for OLAP-style queries
- scope relationship - exists between measure dimensions and regular dimensions to define the level at which the measures are available for reporting
- Shortcut - pointer to an underlying object that can act as an alias or reference

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Within IBM Cognos Connection and the various studios, authors interact with a run-time version of a subset of the Framework Manager model. This subset, which the modeler publishes as a package from Framework Manager to the IBM Cognos server, contains metadata that exists in the development model. It is packaged in a structure reflecting a viewpoint appropriate for report authors and business analysts. The actual data is not published with the package; it is retrieved from the underlying data source at run time.

In Framework Manager, you can create several packages containing different subsets of the model.

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Demo 1: Examine the Final Project

Purpose:
Before you begin the modeling process for your Great Outdoors model, you will explore the Framework Manager UI and view the final results of the model you will build by the end of this course. This will help bring context to the tasks ahead of you.

Components: **Framework Manager, Business Insight Advanced**

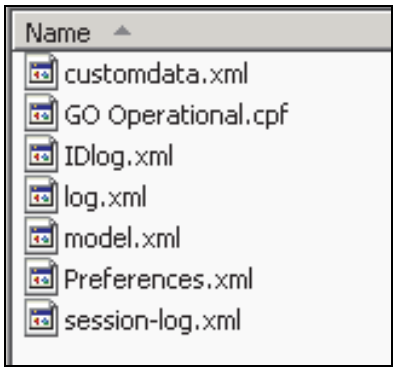
Project: **GO Operational**

Package: **GO Operational (query)**

Task 1. Examine the Framework Manager UI and view the top-level objects.

1. Launch **Windows Explorer**, and then navigate to **C:\Edcognos\B5152\CBIFM-Files\Final**.

 The results appear as follows:

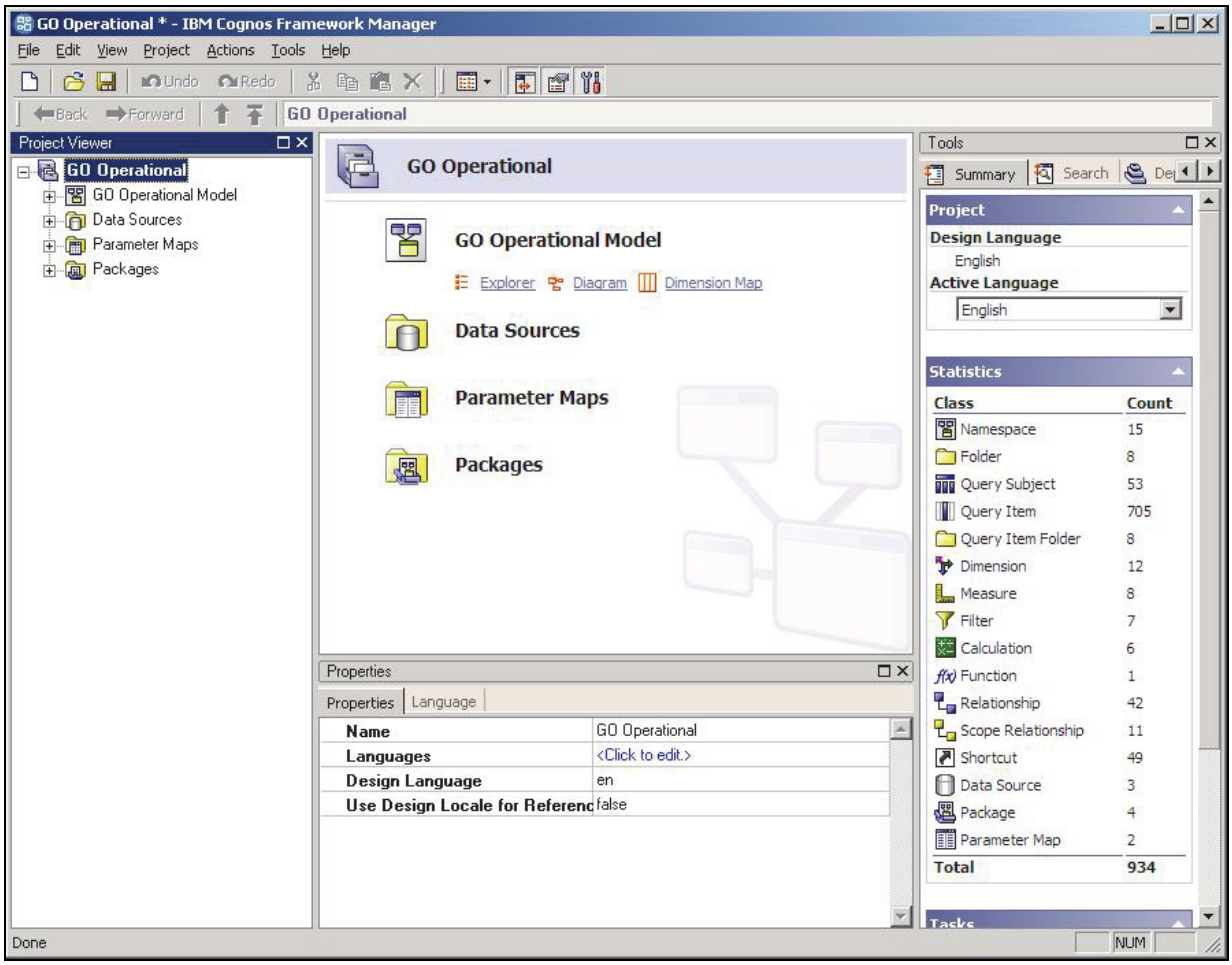


 Here you see the project files for the final Framework Manager model you will be building throughout this course. The cpf file is the main project file. The xml files store model information, preferences, session logging, action logging (each modeling action you make), and so on.

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2. From the **Start** menu, point to **All Programs>IBM Cognos 10**, and then click **IBM Cognos Framework Manager**.
3. Click **Open a project**, navigate to **C:\Edcognos\B5152\CBIFM-Files\Final**, and then double-click **GO Operational.cpf**.
4. Log in as **admin/Education1!**.

 The results appear as follows:



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Take the time to examine the different UI elements.

Project Viewer pane: By default this pane is on the left and provides an easy way to access all your project's objects in a tree format.

Project Info pane: This is the center pane and also provides access to the project's objects through various methods. Three tabs (Explorer, Diagram, and Dimension Map) allow you to create, edit, configure, or delete objects. You will use each of these throughout the course.

Properties pane: This pane allows you to configure various properties for any of the project's objects.

Tools pane: This pane provides several useful tools. You can use it to quickly switch the project language in this pane as well as view project statistics, and quickly perform common tasks for selected objects. This pane also provides a search utility (second tab) and an object dependencies utility (third tab). Simply drag an object (and its children if it has any) to the top panel, select the object or one of its children in the top panel and view the dependant objects in the bottom panel. This is very useful when you want to change an object and assess the impact that the change will have on other objects in the model.

All panes can be hidden except the Project Info pane, which is the main work area. To bring them back, simply select them from the View menu or use the toggles on the toolbar. You can also detach and rearrange the Project Viewer, Properties and Tools panes.

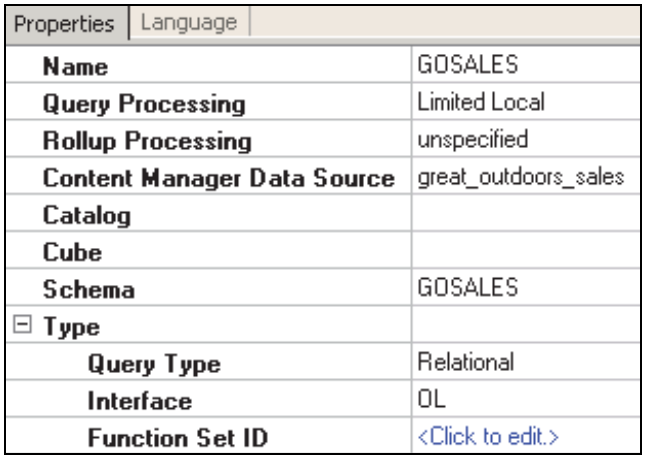
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Now that you have examined the main elements of the Framework Manager UI, take the time to examine the project.

In the project viewer examine the top level-objects. They are a GO Operational Model namespace (contains model objects), a Data Sources folder (contains the data sources used in the project), a Parameter Maps folder (contains parameter maps that allow for data substitution at run time), and a Packages folder (contains packages that are published to IBM Cognos to make model metadata available to authors).

5. Expand **Data Sources**, click **GOSALES**, and then expand **Type** in the **Properties** pane.

 The results appear as follows:

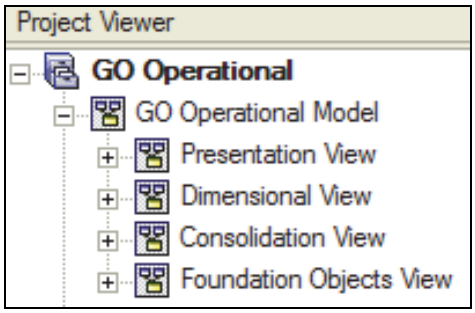


 Notice the Query Type property indicates that these are relational sources.

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6. Expand **GO Operational Model**.

The results appear as follows:



Notice the four namespaces for logical separation of objects by function.

Foundation Objects View contains the "base" query subjects; data source query subjects as well as any model query subjects used to resolve reporting issues.

Consolidation View is an isolation layer. It is made up of model query subjects that are used as containers to consolidate multiple query subjects into one (such as Product, Product Type, and Product Line). It also simplifies query subjects by hiding codes or organizing them in subfolders. This layer insulates reports from potential changes in the underlying data source.

Dimensional View contains multidimensional objects based on model query subjects in the Consolidation View. These are used for OLAP-style queries and are based on objects in the Consolidation View.

Presentation View contains groupings of shortcuts that present the underlying objects in a logical presentation.

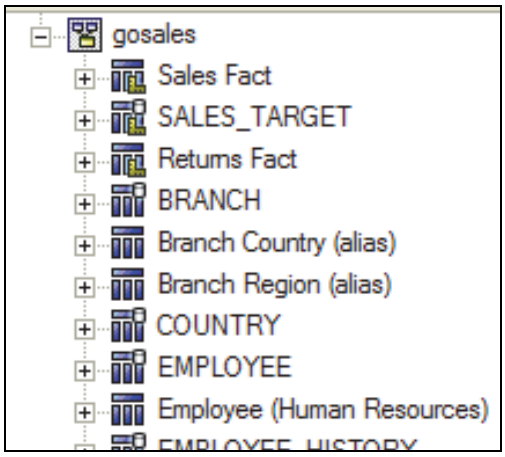
These are the naming conventions used in this course. You can use whatever naming convention and object organization you are comfortable with.

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Task 2. View the detail objects.

1. Expand **Foundation Objects View** > **gosales**.

 The results appear as follows:



 The gosales namespace contains all the data source query subjects (represented with a small database icon) created during the import process from the GOSALES database as well as model query subjects that are used to alias original data source query subjects or to create views (merge query subjects together to create "As View" behavior) of original data source query subjects.

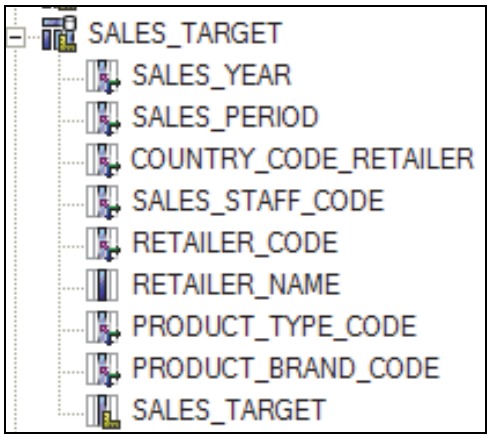
 The small yellow angle ruler icon indicates the query subject contains measures as seen on Sales Fact, SALES_TARGET, and Returns Fact.

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2. Expand **SALES_TARGET**.

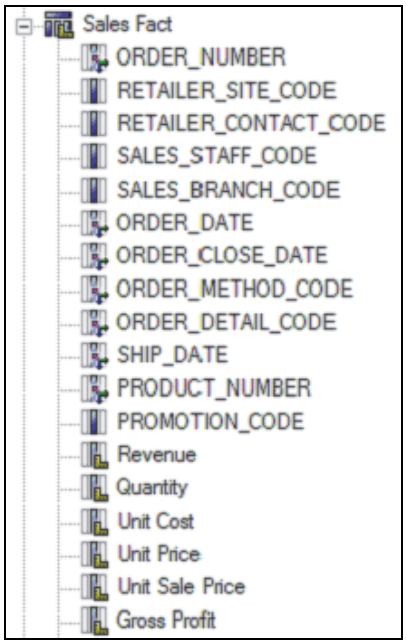
 The results appear as follows:



 Notice that, with the exception of a few property changes, these data source query subjects are untouched after being imported. This is recommended to ease maintenance.

3. Expand **Sales Fact**.

 The results appear as follows:



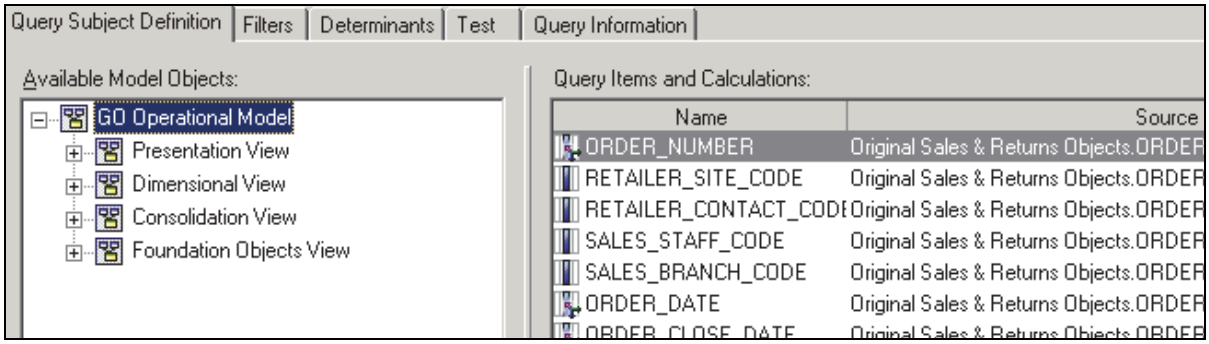
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This is a model query subject that is the result of merging two data source query subjects together to create "As View" behavior.

Query items to be used by authors have been given user-friendly names. This is not needed for query items that will not be included in the final Presentation View. Calculations have also been implemented in this object.

4. Double-click **Sales Fact** to open its definition dialog.

The results appear as follows:

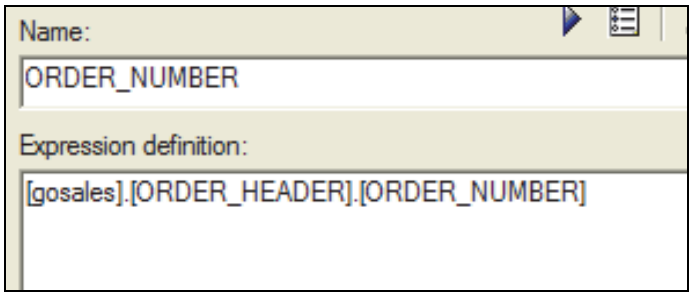


Here you can see all the query items that make up the model query subject as well as any filters or determinants that might be specified. The source column tells you how the query item is derived. You can edit the definition of each query item in this dialog by clicking the ellipses in the Source column. You can also go directly to the query item definition from the Project Viewer tree. You will do this now.

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5. Click **Cancel**, and then double-click **ORDER_NUMBER**.

 The results appear as follows:

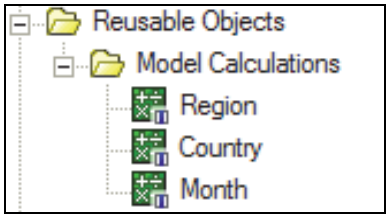


 Here you can see and edit the definition of the query item. The query item can be a direct reference to another item, or a calculation. In this case it is a direct reference that is broken down as follows:

 [Namespace].[Query Subject].[Query Item]

6. Click **Cancel**, and then expand **Reusable Objects** > **Model Calculations**.

 The results appear as follows:

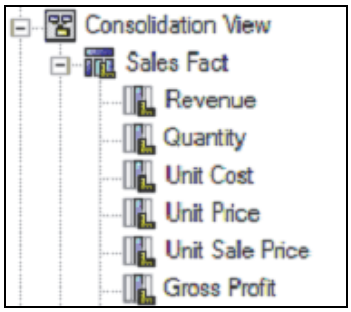


 This folder contains several commonly requested calculations (in this case, the calculation retrieves a specific language value from the data source) to allow maintenance from a single source.

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7. Expand **Consolidation View** and **Sales Fact**.

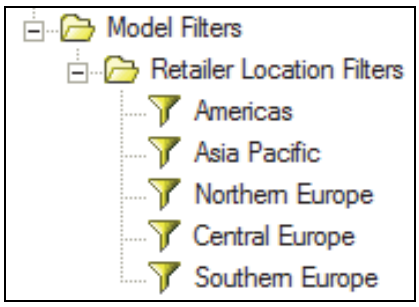
 The results appear as follows:



 This namespace is a simplified version of Sales Fact from the Foundation Objects View. It only contains the measures (facts), hiding the complex keys. This layer is a consistent presentation where all objects simply act as containers to consolidate information from the underlying Foundation Objects View. This layer also contains calculations, filters, and appropriate naming conventions. These are the objects authors will work with directly or indirectly.

8. Expand **Model Filters** > **Retailer Location Filters**.

 The results appear as follows:

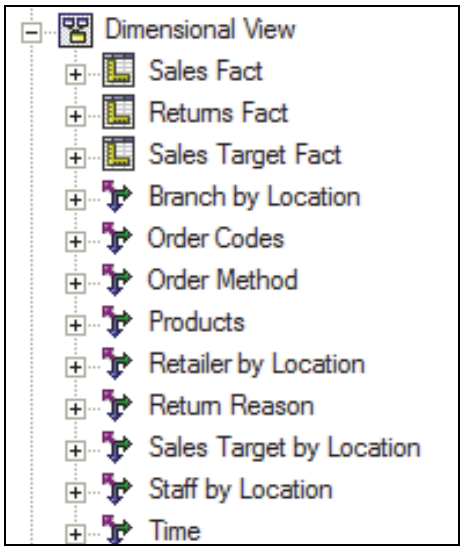


 These folders contain several filters that authors can pick from to simplify report filtering.

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9. Expand **Dimensional View**.

The results appear as follows:

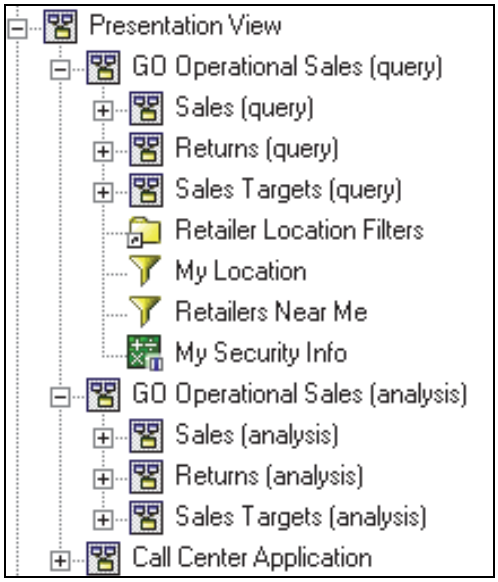


Here you can see dimensions and measures based on objects in the Consolidation View. Dimensional information (hierarchies, levels, attributes, and so on) is provided in this view. These objects are used for OLAP-style queries in Business Insight, Analysis Studio, Query Studio, and Report Studio.

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10. Expand **Presentation View**, and then **GO Operational Sales (query)** and **GO Operational Sales (analysis)**.

 The results appear as follows:

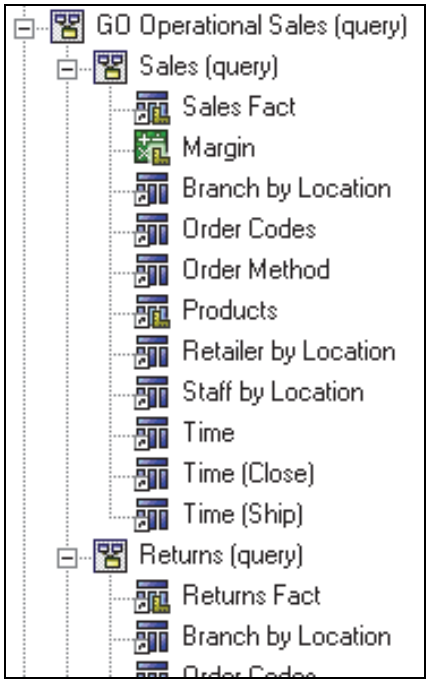


 Here you can see two namespaces, one containing objects for queries and reports, and the other for analysis. There is also a Call Center Application namespace that is specific to a particular application to quickly retrieve order information.

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11. In **GO Operational Sales (query)**, expand **Sales (query)**, and **Returns (query)**.

 The results appear as follows:



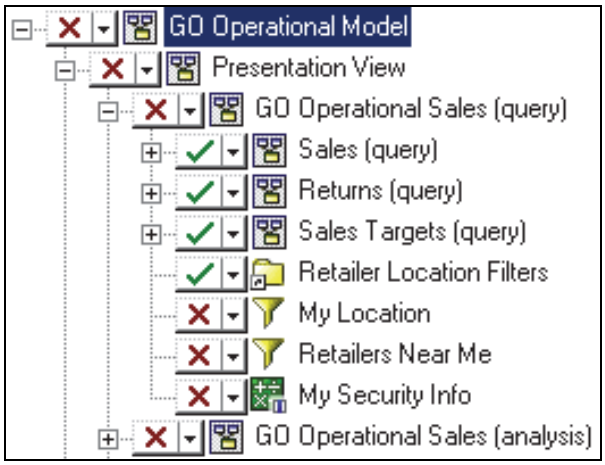
 These two namespaces contain shortcuts that logically group the Consolidation View objects. Facts are grouped with their related dimensions. The namespaces have some overlapping object names (conformed dimensions). To create multi-fact queries across multiple areas of the business, include at least one conformed dimension.

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Task 3. View the package as a report author.

1. Expand **Packages**, and then double-click **GO Operational (query)**.

 The results appear as follows:



 The package contains a subset of the project specific to objects to be used for relational queries and reports.

2. Click **Cancel**, right-click **GO Operational (query)**, and then click **Publish Packages**.
3. Click **Next**, click **Next**, deselect **Verify the package before publishing**, and then click **Publish**.
4. Click **Finish**.
5. Open your Internet browser and navigate to the following page: **http://localhost:88/ibmcognos**.
6. Log on as **admin/Education1!**.

 This will log you in to IBM Cognos Connection.

7. Click **Author business reports**, and then click **GO Operational (query)**.

 This is the package you just published.

8. Click **Create new**, select **List** and then click **OK**.

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9. In the **Insertable Objects** pane, ensure the **Source** tab is selected, and then expand **Sales (query)** and **Returns (query)**.

 Notice that this is the same structure and grouping seen in the Presentation View in the previous task.

10. Add the following items to the report:

Query Subject	Query Item
Sales (Query)>Products	**Product Line**
Sales (Query)>Time	**Year**
Sales (Query)>Sales Fact	**Revenue**
Returns (Query)>Returns Fact	**Return Quantity**

11. Click the **Product Line** column and click the **Group**  icon to group the report on **Product Line**.

 The results appear as follows:

Product Line	Year	Revenue	Return Quantity
Camping Equipment	2004	$332,986,338.06	60,966
	2005	$402,757,573.17	66,256
	2006	$500,382,422.83	97,617
	2007	$352,910,329.97	79,604
Camping Equipment - Summary		**$1,589,036,664.03**	**304,443**

 Using this intuitive view of the metadata, you can create queries quickly and easily.

12. Close the browser without saving the report.

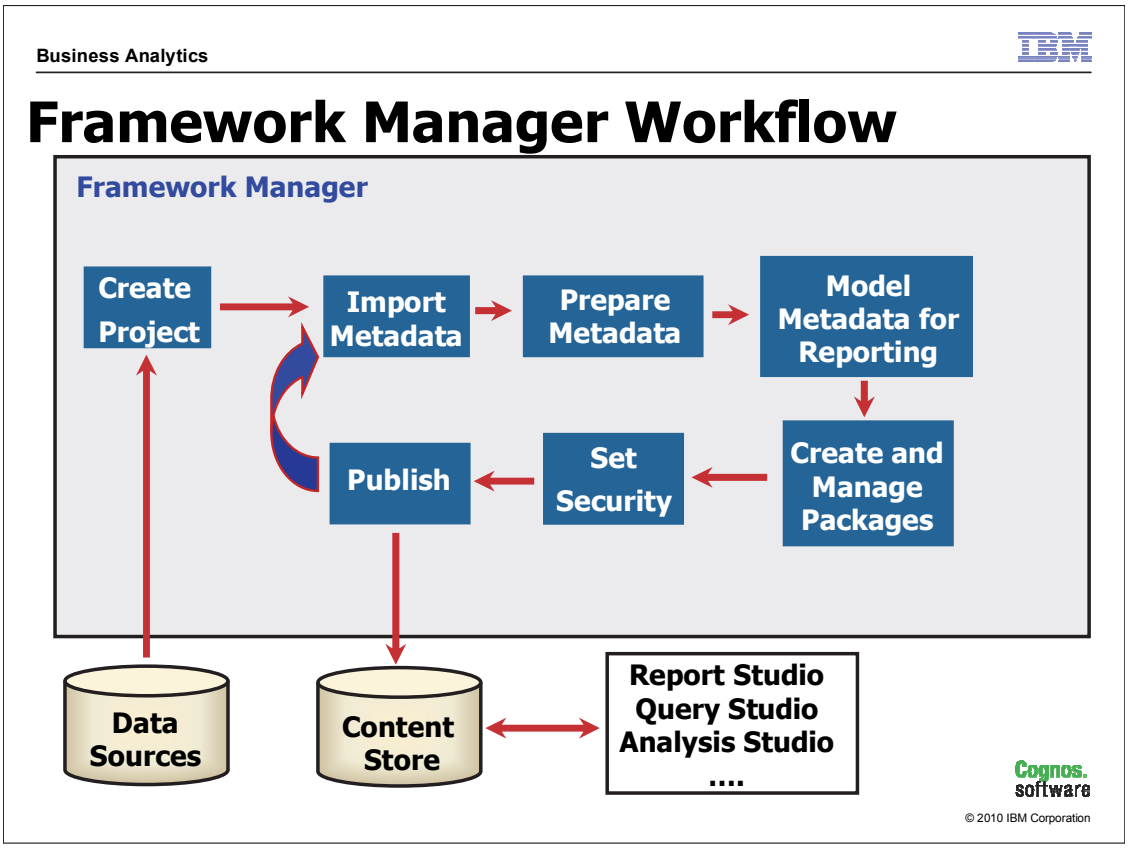
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13. In **Framework Manager**, from the **File** menu, click **Close** to close the project without saving changes.

Results:
You explored the Framework Manager UI and saw some of the final results in the model that you will build throughout this course. You also saw the benefits of creating a simple-to-use view of the metadata for the business.

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Import Metadata - import objects such as tables, views, and procedures

Prepare Metadata - examine and modify properties and relationships

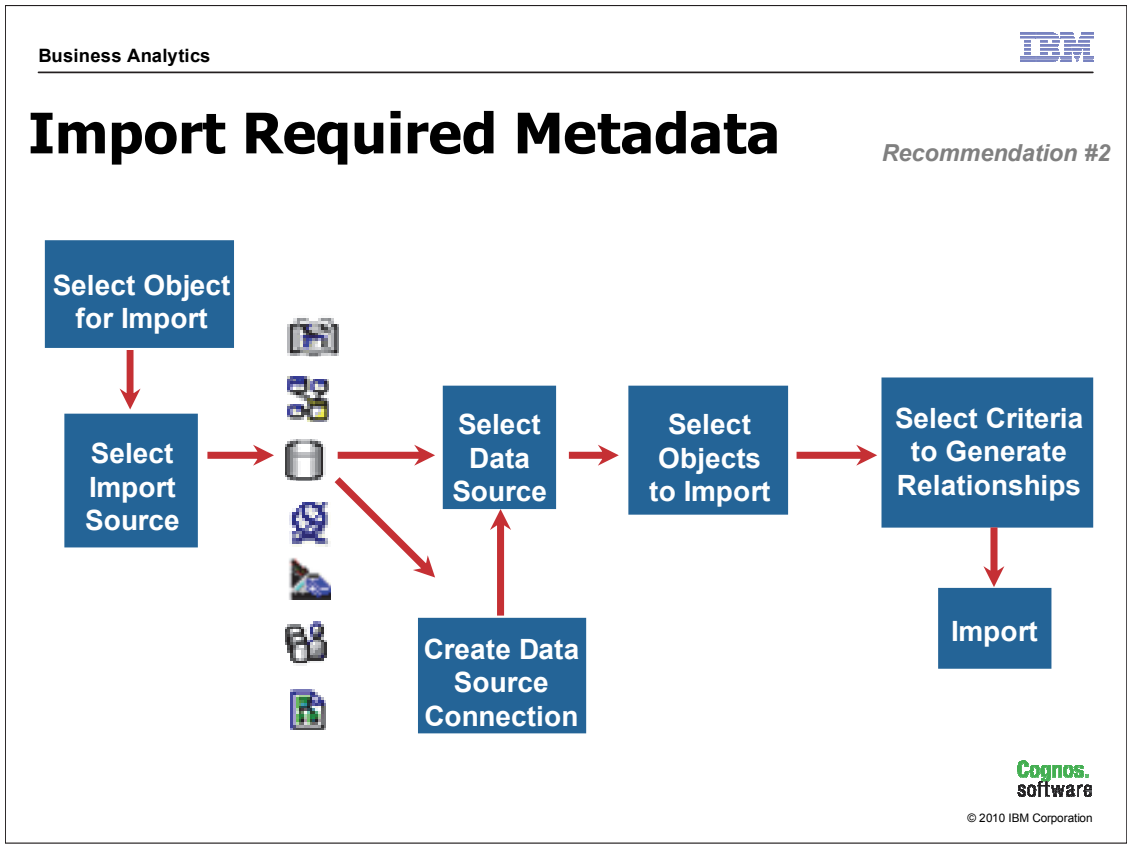
Model Metadata for Reporting - add business value specific to reporting requirements and model for predictable results

Create and Manage Packages - identify subsets of the metadata to be published

Set Security - apply security at various levels to restrict access

Publish - publish packages to the IBM Cognos servers for use by report authors and business analysts

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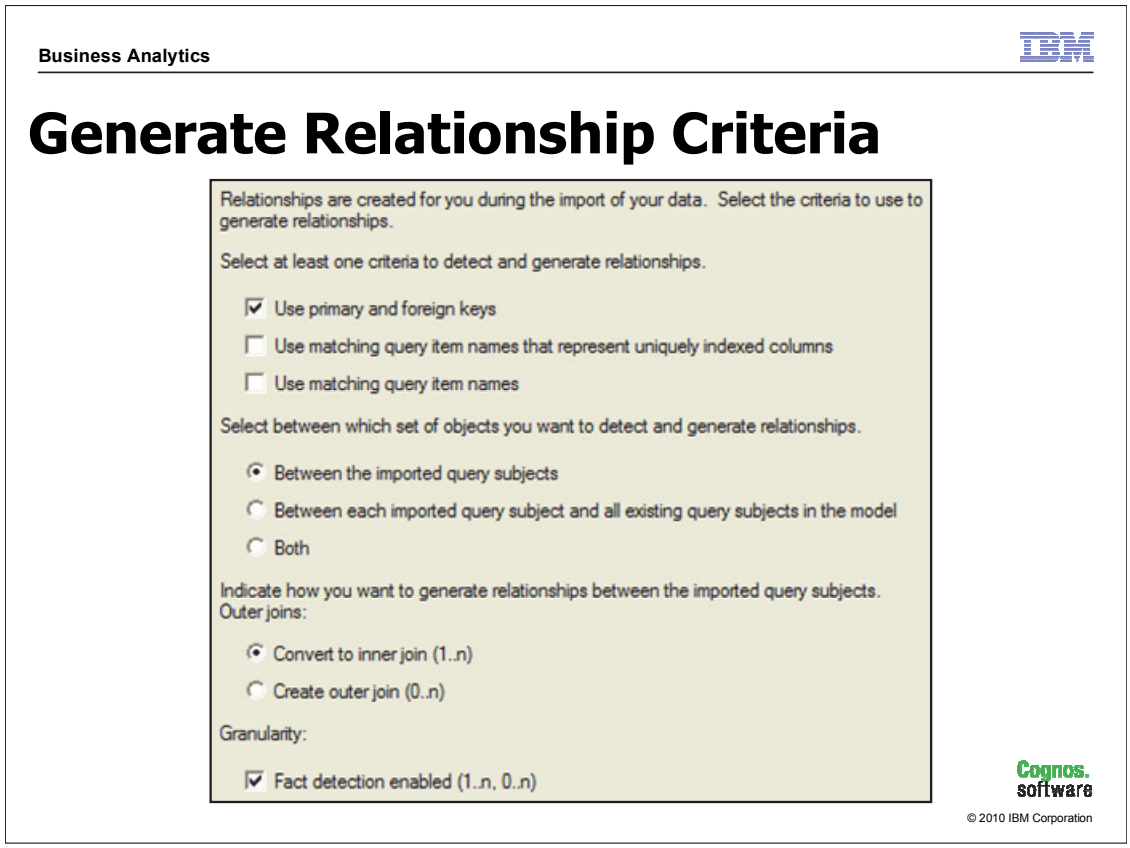


Import only the required metadata in a phased approach to minimize clutter in the model.

For relational data sources, choose the model object into which you will import, and then do the following:

1. Select Data Sources as the import source.
2. Either select the data source to be used (usually a relational database), or create a data source connection and then select it. If you create a data source connection, specify the name and type (such as MSSQL, Oracle, DB2); specify the connection string (if necessary); specify a signon; and test the connection.
3. Select the required objects to import; for example, tables, views, or procedures.
4. Select the criteria by which Framework Manager will generate relationships.

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This dialog box is part of the Import Metadata Wizard.

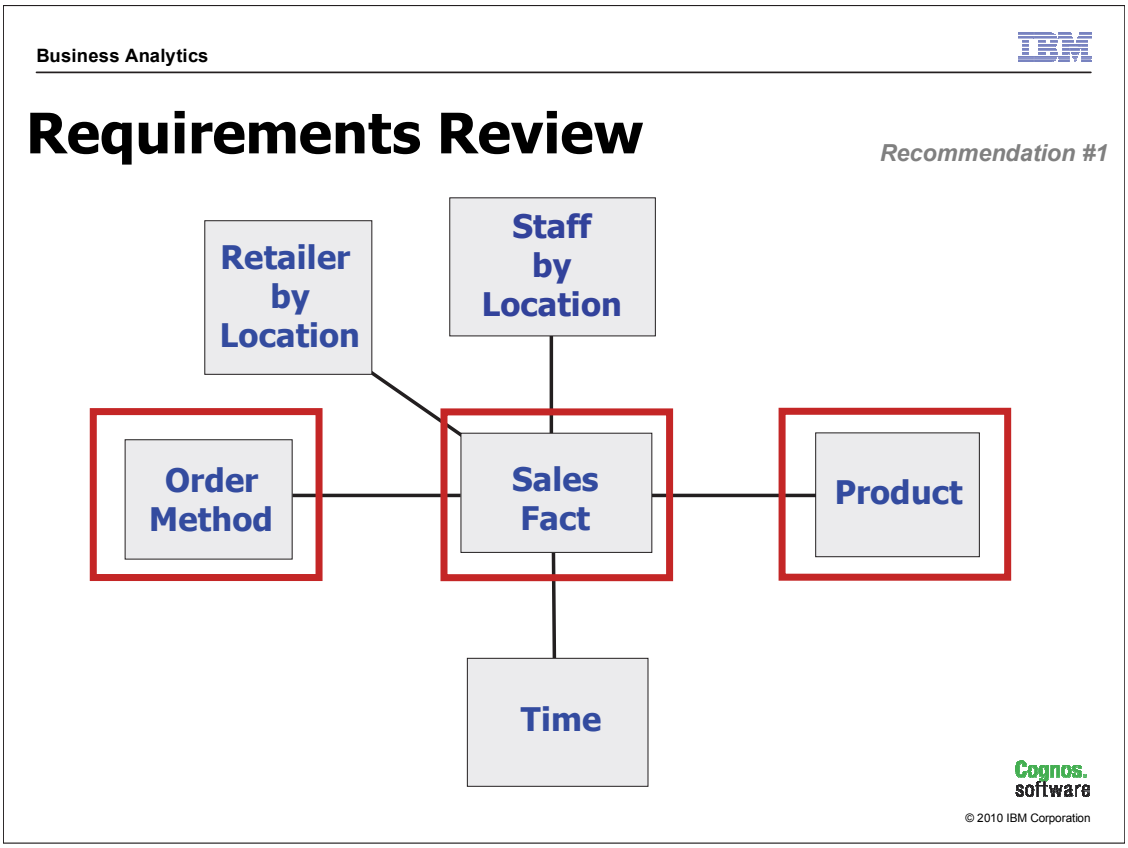
In general, use the first check box for relational data from the same database. The other two check boxes are often used when importing from a different database.

You can request to create relationships among either the objects being imported, or the objects being imported and the existing objects in the model, or both.

By default, an import converts outer joins to inner joins. This is done for performance reasons. You can choose to generate outer joins if that meets your business needs or you can edit specific relationships after import to meet your needs.

Another option is to enable or disable fact detection. If this option is disabled, all relationships will be 1..1 to 1..1.

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In the next demo, you will import metadata to satisfy the highlighted reporting requirements above. The database tables used to satisfy each requirement are as follows:

Reporting Requirement	Database Tables
Sales Fact	ORDER_DETAILS ORDER_HEADER
Order Method	ORDER_METHOD
Product	PRODUCT PRODUCT_LINE PRODUCT_NAME_LOOKUP PRODUCT_TYPE

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Demo 2: Create a Baseline Project

Purpose:
Your first step as a data modeler for The Great Outdoors Company is to create a new project, specify the data it will use, and start the metadata modeling process.

Component: **Framework Manager**

Project: **GO Operational**

Task 1. Create a project.

1. Launch **Framework Manager**, and under **Projects**, click **Create a new project**.
2. In the **Location** box, click **Browse**, navigate to **C:\Edcognos\B5152** and create a new folder called **Course_Project**.
3. Select the **Course_Project** folder, click **OK**, and then in the **Project name** box, type **GO Operational**.

 The GO Operational folder is created by default and appears by default in the Location box.
4. Click **OK**, and then log in as User ID **admin**, and Password **Education1!**, if prompted.

 The Select Languages dialog box appears. You will initially set the default and design language for this project as English.
5. Ensure that **English** is selected, and then click **OK**.

 The Metadata Wizard appears. You will first organize your project and then import metadata into the appropriate location in a later task.
6. Click **Cancel**.

 The project opens in Framework Manager. Notice in the Project Viewer that the project appears with the name you provided and a default namespace called Model.

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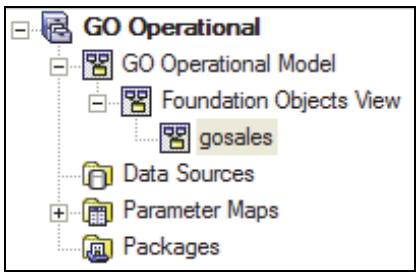
Task 2. Create and organize objects.

1. Rename the **Model**  namespace to **GO Operational Model**.

 Tip: You can press F2 to edit the label.

2. Right-click the **GO Operational Model** namespace, point to **Create**, and then click **Namespace**.
3. Rename **New Namespace** to **Foundation Objects View**.
4. Right-click the **Foundation Objects View** namespace, point to **Create**, and then click **Namespace**.
5. Rename **New Namespace** to **gosales**.

 The model appears as shown below:



Creating the gosales namespace makes the Foundation Objects View extensible in the event you want to import metadata from another data source. At the time of the import of the second data source, you would create another namespace to contain those data source query subjects.

You will now begin the process for importing the metadata into the gosales namespace. You will start by creating a data source and testing the connection to it.

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Task 3. Create a data source and test the connection.

1. Right-click the **gosales** namespace, and then click **Run Metadata Wizard**.

 The Metadata Wizard appears. From here you can select the source from which you will import the metadata. You will import data from a relational database.

2. Ensure that **Data Sources** is selected, and then click **Next**.

 You are now prompted to select a data source from the list of available data sources. The data source you need to access is currently not available. You must create a connection to the database from which you are importing metadata. You are connecting to the GOSALES database, which is a DB2 database.

3. Click **New**.

 The Welcome page of the New Data Source Wizard appears. This is the same wizard that is used to create data sources through the Directory tool in the IBM Cognos Connection administration interface.

4. Click **Next**, in the **Name** box, type **GOSALES**, and then click **Next**.

5. In the **Type** list, click **IBM DB2**, leave the default isolation level, and then click **Next**.

6. In the **DB2 database name** box, type **GS_DB**.

7. Under **Signons**, select the **Password** check box, in the **User ID** box, type **GOSALES**, and then in the **Password** and **Confirm password** boxes, type **Education1!**.

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8. Click **Test the connection**, and then click **Test**.

 The View the results - Test the connection page appears indicating that the test succeeded.

9. Click **Close**, and then click **Close** again.

10. Click **Finish**, and then click **Close**.

 A new data source called GOSALES, through which you will import metadata, now appears in the list.

 You will now take a moment to view this data source in IBM Cognos Connection.

11. Launch **IBM Cognos Connection**, log on, click on **Administer IBM Cognos content**, and then click the **Configuration** tab.

 The GOSALES data source appears in the list. You could have also created the data source here rather than through Framework Manager. If you need to edit the data source connection, you will need to do it in this location.

12. Close **IBM Cognos Connection**.

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Task 4. Import metadata.

1. Ensure the newly created **GOSALES** data source is selected, and then click **Next**.
2. In the list of objects, expand **GOSALES** > **Tables**.
3. Select the following initial tables:

 ORDER_DETAILS
 ORDER_HEADER
 ORDER_METHOD
 PRODUCT
 PRODUCT_LINE
 PRODUCT_NAME_LOOKUP
 PRODUCT_TYPE

4. Click **Next**, leave the defaults for the **Generate Relationship** criteria, and then click **Import**.

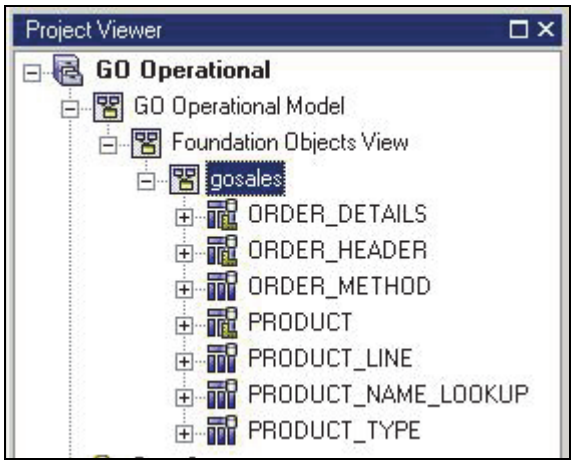
 The import process begins, and then a message appears summarizing the seven query subjects and six relationships that were imported.

5. Click **Finish**.

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6. In the **Project Viewer** pane, expand the **gosales** namespace.

 The results appear as follows:



 The namespace now contains a list of data source query subjects, which represent each of the tables that were imported from the relational database.

7. Expand the **Data Sources** folder.

 The results appear as follows:



 This folder now contains the GOSALES data source, which you specified during the import. This data source is now associated with the objects you just imported.

8. Select the **GOSALES** data source.

9. In the **Properties** pane, ensure the **Query Processing** property is set to **Limited Local**.

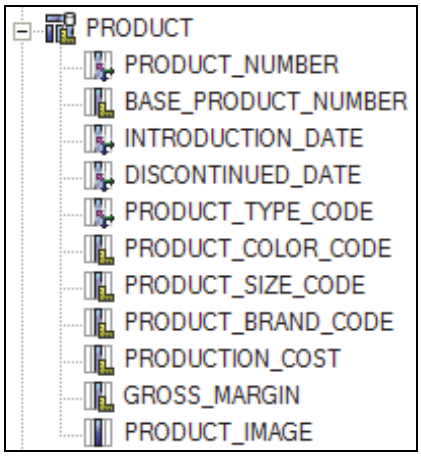
 This will allow IBM Cognos to process operations locally that are not supported by the data source.

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Task 5. Test basic data access.

1. In the **Project Viewer**, expand **PRODUCT**.

 The results appear as follows:



 Here you see all the query items for this query subject. These query items represent the columns found in the data source table.

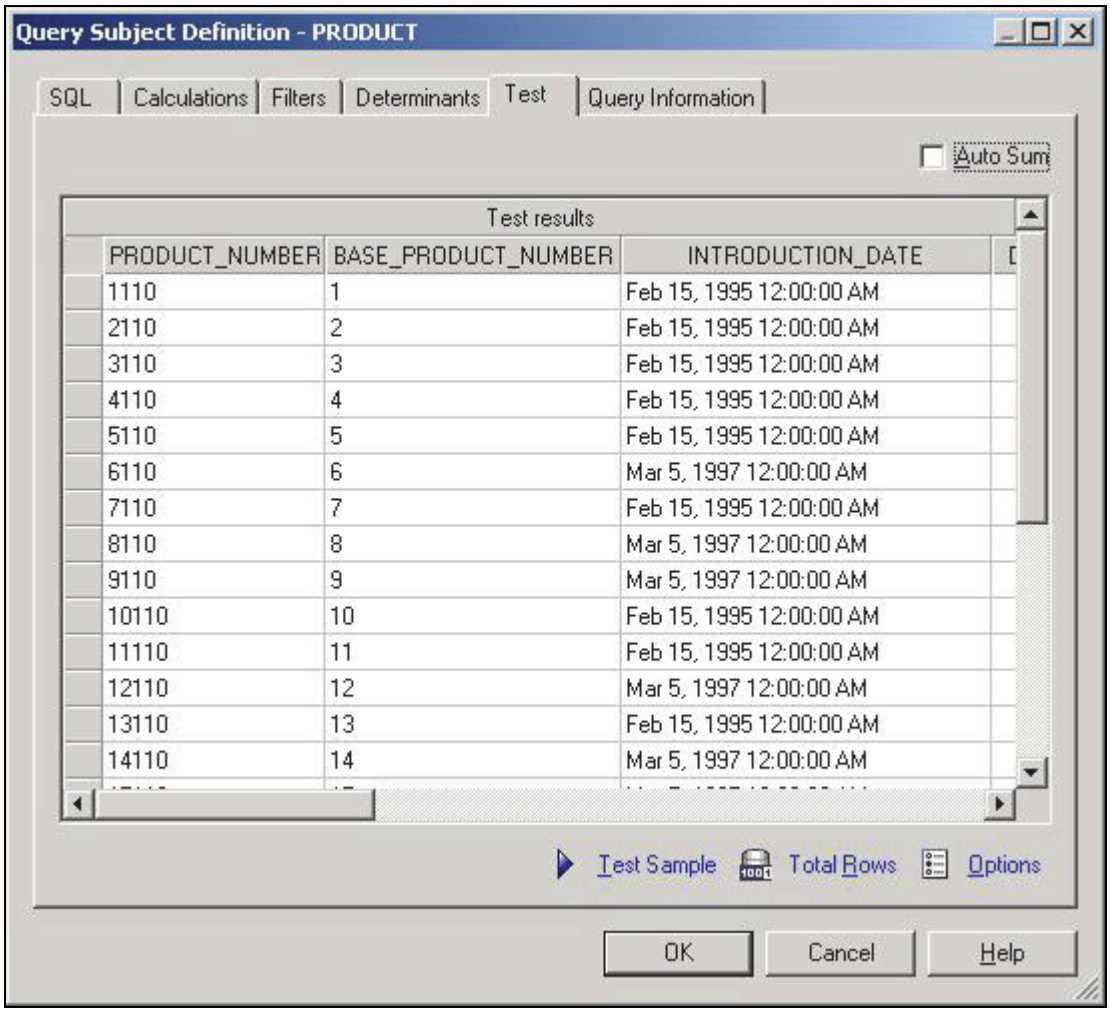
2. Double-click **PRODUCT**.

 The SQL tab shows "Select * from [GOSALES].PRODUCT". This SQL statement defines the scope of the PRODUCT query subject. It is used to generate your query item list as well as the run time SQL when you create a query using the query items. The [GOSALES] portion is the name of the data source the query subject is associated with.

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3. Click the **Test** tab, and then click **Test Sample** in the bottom right corner.

 The results appear as follows:

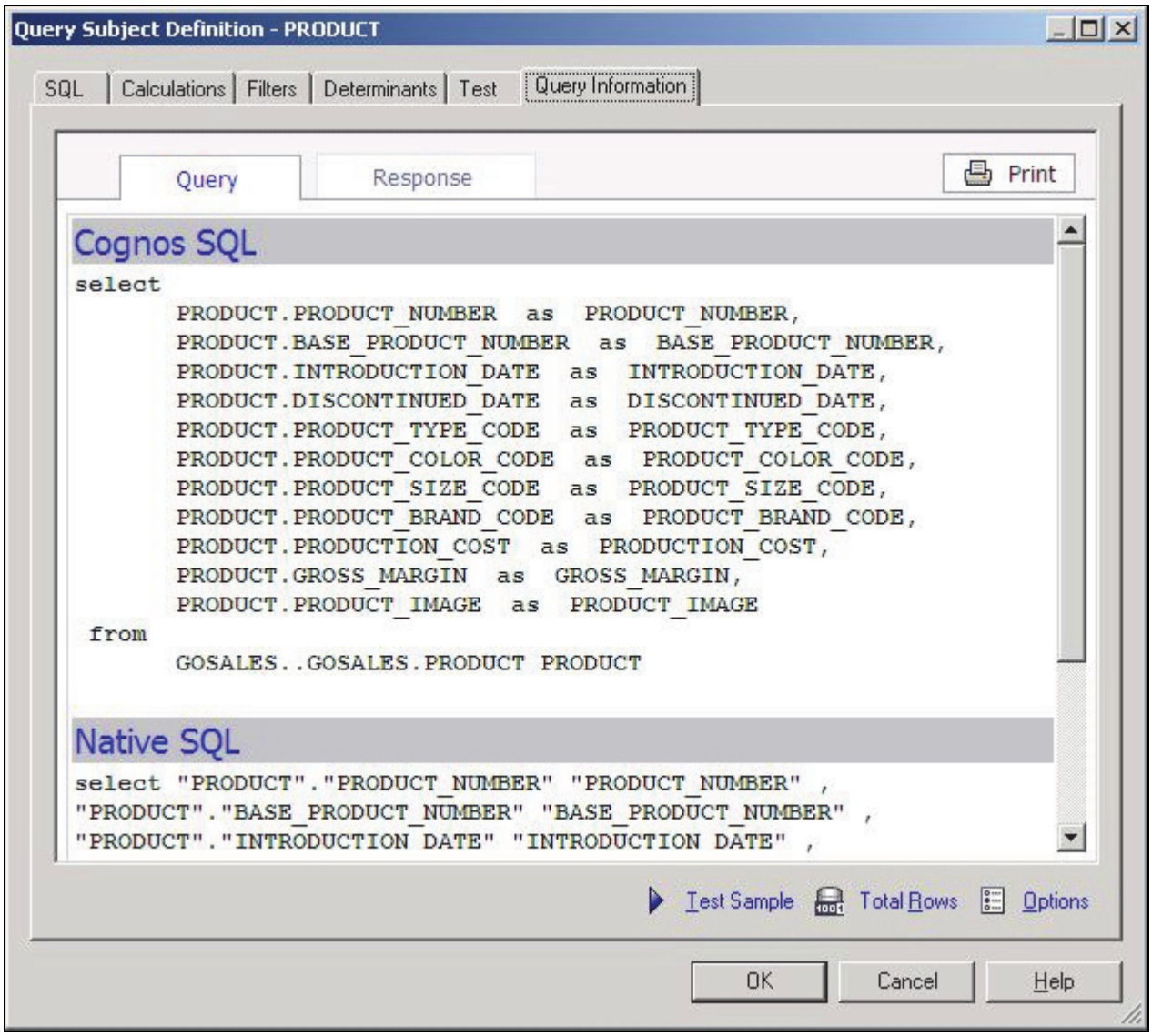


You see a sample of the first 25 records, confirming your access to the data. You can increase or decrease the amount of rows retrieved in the Options located in the lower right corner. If you want to know how many rows of data there are in the data source table, click Total Rows.

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4. Click the **Query Information** tab.

 The results appear as follows:



 You see the full SQL in two formats: the generic Cognos syntax (Cognos SQL) and the syntax specific to the data source (Native SQL). This is the SQL generated at run time and passed to the data source. The SQL generated here is based on the SQL defined on the SQL tab of the data source query subject.

5. Click **OK** to close the **Query Subject Definition** dialog box.

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Task 6. Change SQL generation settings and specify a function list.

1. From the **Project** menu, click **Edit Governors**.

 These properties govern the queries that are generated based on the model. These will be described in more detail later in the course.

2. Clear the **Use WITH clause when generating SQL** checkbox, and then click **OK**.

 You will now specify a function list specific to the data source you are using in this model. These functions are specific to the database vendor and allow authors and modelers to perform advanced tasks with the data sources such as date and string manipulations.

 Specifying a function set per data source will limit the function sets that are published to IBM Cognos with a package. By default, all supported function sets are published with a package. Publishing only the required functions sets can reduce the package size and prevent confusion where authors may inadvertently use functions from another data source.

3. From the **Project** menu, click **Project Function List**.

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4. Select **Set function list based on the data source type**, and then in the **Function set** column beside **GOSALES**, select **DB2**.

 The results appear as follows:



 Now, by default, only DB2 functions will be published with a package in this project.

5. Click **OK**.

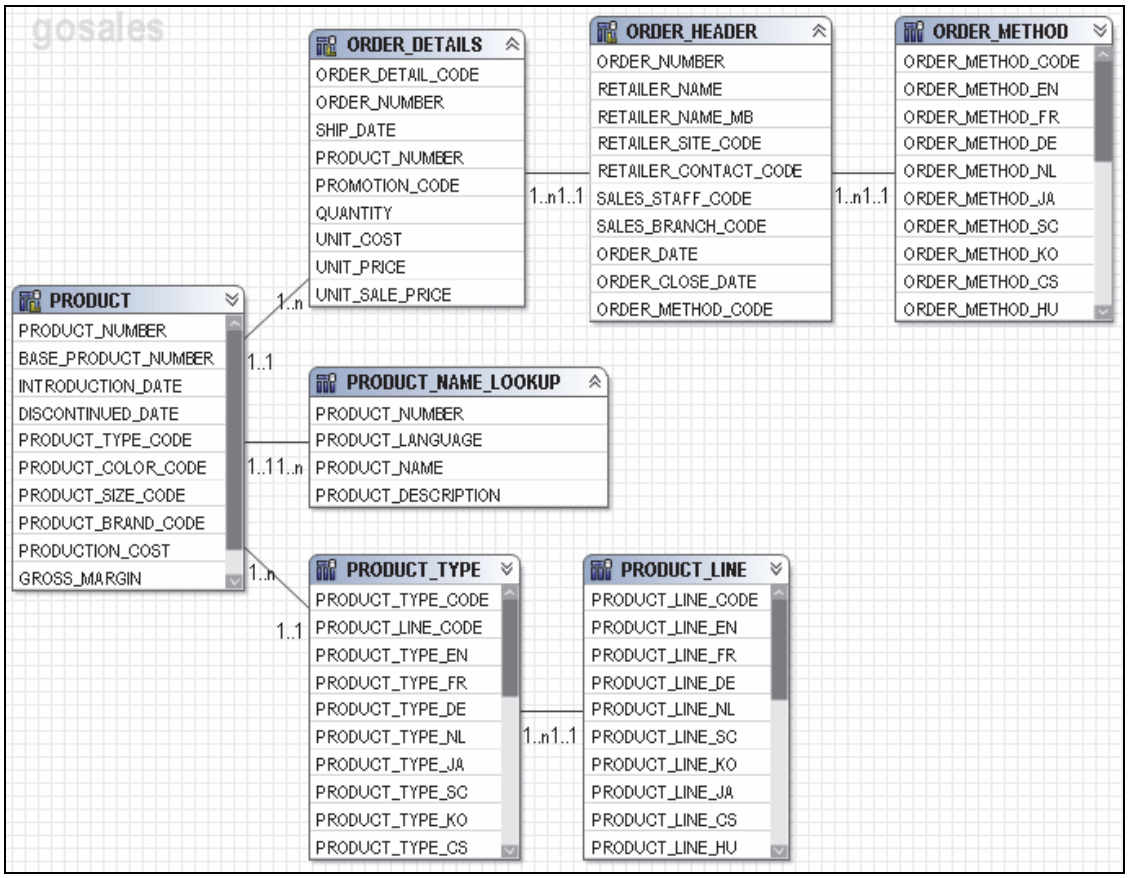
Task 7. Test multiple query subject data access.

1. If necessary, in the center pane click **Diagram**.
2. Close the **Properties** and **Tools** panes to view more of the center pane diagram, and then double-click the **gosales** box to focus on the **gosales** namespace.

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3. Select the **Diagram** tab and, if necessary, on the toolbar, click **Fit All** .

 The results appear as follows:



Note: Here you can see all the relationships generated by Framework Manager during import. These relationships allow IBM Cognos to generate the appropriate SQL at run time to join query items from the different query subjects. You can adjust the settings of the diagram from the Diagram menu. There are several options. For example, you can choose to view cardinalities in Merise notation (as seen in the screen capture) or Crowsfeet notation (provides a pictorial representation of the relationship). Take a moment to explore the options.

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4. In the **diagram**, select the following query items:

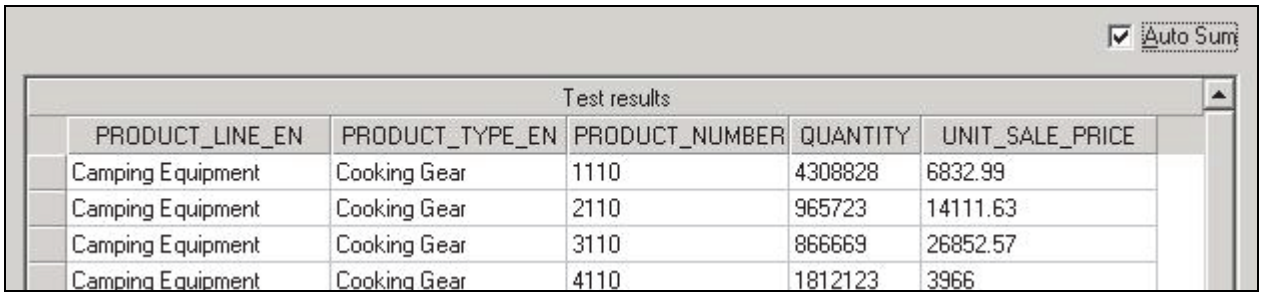
Query Subject	Query Item
PRODUCT_LINE	**PRODUCT_LINE_EN**
PRODUCT_TYPE	**PRODUCT_TYPE_EN**
PRODUCT	**PRODUCT_NUMBER**
ORDER_DETAILS	**QUANTITY** **UNIT_SALE_PRICE**

5. Right-click one of the selected items, click **Test**, and then click **Test Sample**.

 A sample 25-row report confirms that you can access the data. Note the values for quantity and unit sale price.

6. In the top right corner of the window, click **Auto Sum**, and then click **Test Sample** again.

 The results appear as follows:



 This time, you see that QUANTITY has been summed. UNIT_SALE_PRICE has also been summed, which we will correct later.

7. Close the **Test Results** dialog box, and then save the project.

Results:
You started to develop the model that will support the business requirements of report and ad hoc query authors. You created a project, structured it, and imported baseline metadata.

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Demo 3: Publish a Package

Purpose:
Now that you have a baseline project, you will verify its reporting capabilities by publishing a package and using it to view data in Business Insight Advanced.

Components: **Framework Manager**, **Business Insight Advanced**

Project: **GO Operational**

Package: **GO Operational**

Task 1. Create and publish a package.

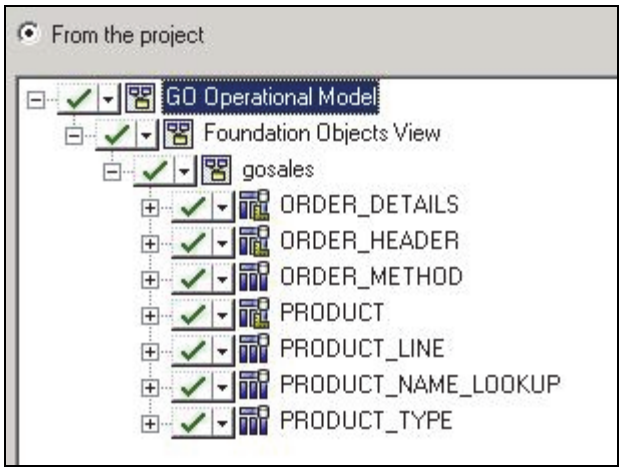
1. In the **Project Viewer** pane, right-click **Packages**, point to **Create**, and then click **Package**.

 The Create Package Wizard appears. Since the package will include the full contents of the project, you will give it the same name as the project.

2. In the **Name** box, type **GO Operational**, and then click **Next**.

3. Expand **Foundation Objects View** and **gosales**.

 The results appear as follows:



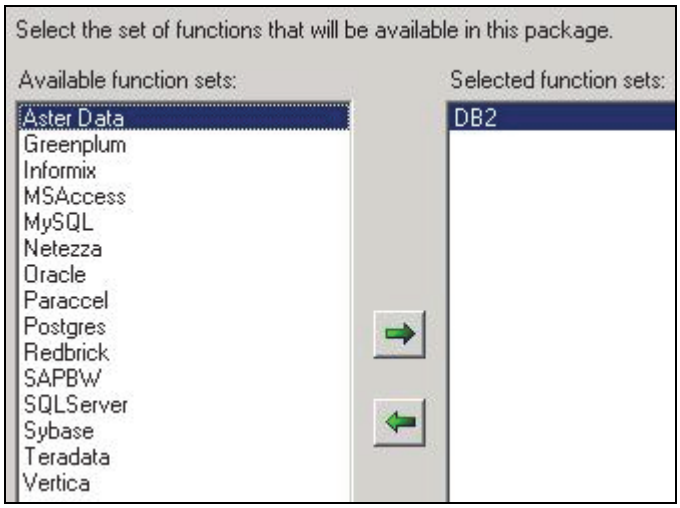
 This is where you can restrict the package contents to a subset of your model.

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4. Click **Next**.

 The results appear as follows:



 Here you have the option to specify which function sets get published with the package. Since you associated SQL Server functions with the GOSALES data source, it is by default, the only function set currently selected.

5. Click **Finish**.

 A dialog box appears indicating that the package was created successfully, and prompts you to open the Publish Package wizard. Publishing places a package in the IBM Cognos Content Store, where it can be accessed from IBM Cognos Connection and the IBM Cognos Studios.

6. Click **Yes**.

 IBM Cognos allows you to maintain multiple versions of a package. This is done to prevent breaking reports when re-publishing a package with changes that affect the reports. You will not use this feature for most of this course.

7. Clear the **Enable model versioning** check box, accept the remaining defaults, and then click **Next**.

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8. On the **Add Security** page, click **Next**, and then click **Publish**.

 The package is verified by default before the package is published.

 Once verified and published, a message appears within the wizard indicating that the package was successfully published.

9. Click **Finish** to close the wizard, and then save the project.

Task 2. View the package in Business Insight Advanced.

1. Open **Internet Explorer**.
2. In the **Address** box, type **http://localhost:88/ibmcognos**, and then press **Enter**.

 The Log on page appears.

3. Log on as **admin/Education1!**.

 The Welcome page of IBM Cognos Connection appears.

4. Under **My Actions**, click **Author business reports**.

 The Select a package page appears, and prompts you to choose a package to use in creating the report. Note that the GO Operational model you just published is available.

5. Click **GO Operational**.
6. In the **Welcome** dialog, click **Create new**.
7. In the **New** dialog, click **List** and then click **OK**.

 Business Insight Advanced appears in the browser. Under Insertable Objects on the right side of the page, you can see that the GO Operational root namespace and the Foundation Objects View namespace appear. These were the objects you specified in the Publish Package wizard in Framework Manager.

8. Expand **Foundation Objects View**, and then **gosales**.

 The query subjects appear and are available to an ad hoc query author for creating a report.

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Task 3. Create a report.

1. In the **gosales** namespace, expand the **PRODUCT_LINE** query subject, and then double-click the **PRODUCT_LINE_EN** query item.
2. Repeat step 1 to add the following items:

Query Subject	Query Item
PRODUCT_TYPE	**PRODUCT_TYPE_EN**
PRODUCT	**PRODUCT_NUMBER**
ORDER_DETAILS	**QUANTITY** **UNIT_SALE_PRICE**

The results appear as follows:

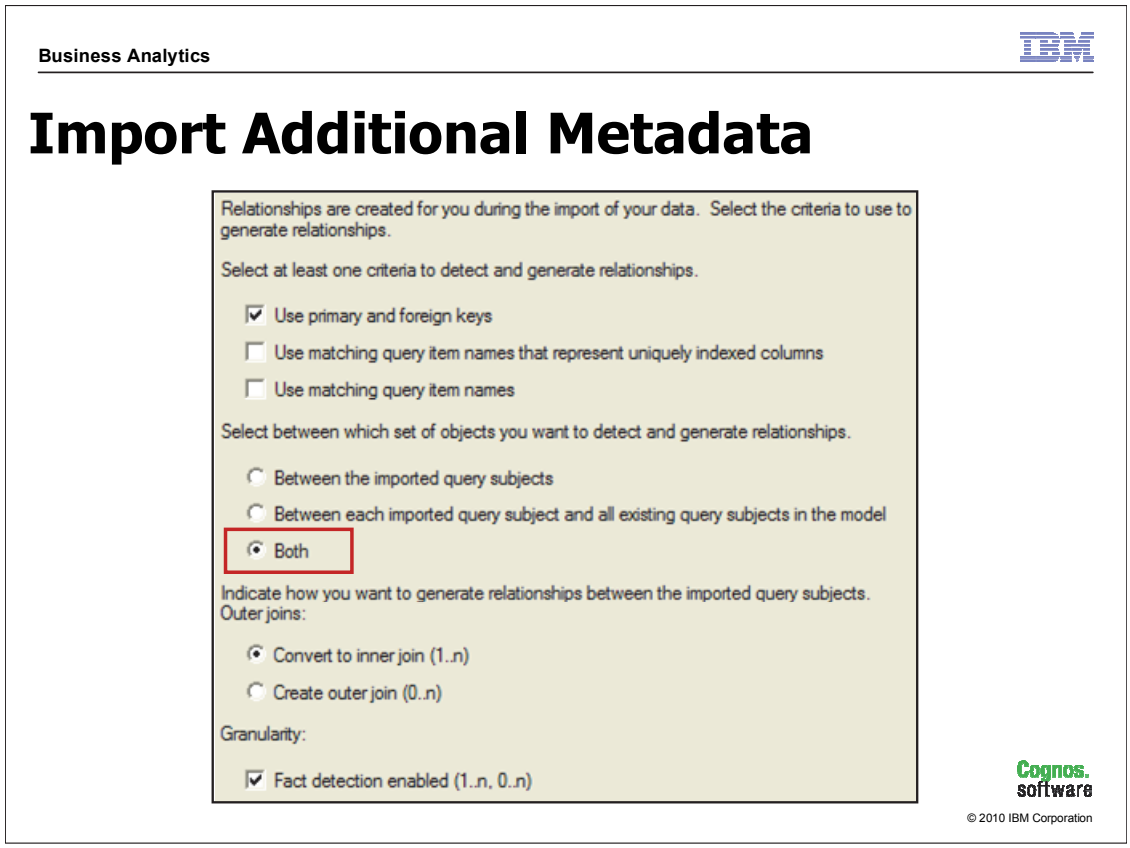
PRODUCT_LINE_EN	PRODUCT_TYPE_EN	PRODUCT_NUMBER	QUANTITY	UNIT_SALE_PRICE
Camping Equipment	Cooking Gear	1110	4,308,828	6,832.99
Camping Equipment	Cooking Gear	2110	965,723	14,111.63
Camping Equipment	Cooking Gear	3110	866,669	26,852.57
Camping Equipment	Cooking Gear	4110	1,812,123	3,966
Camping Equipment	Cooking Gear	5110	813,780	62,344.6

You have successfully created the same ad hoc query you tested in Framework Manager earlier. Here the values are automatically sorted and summarized.

3. Close **Internet Explorer**, do not save changes, and leave **Framework Manager** open.

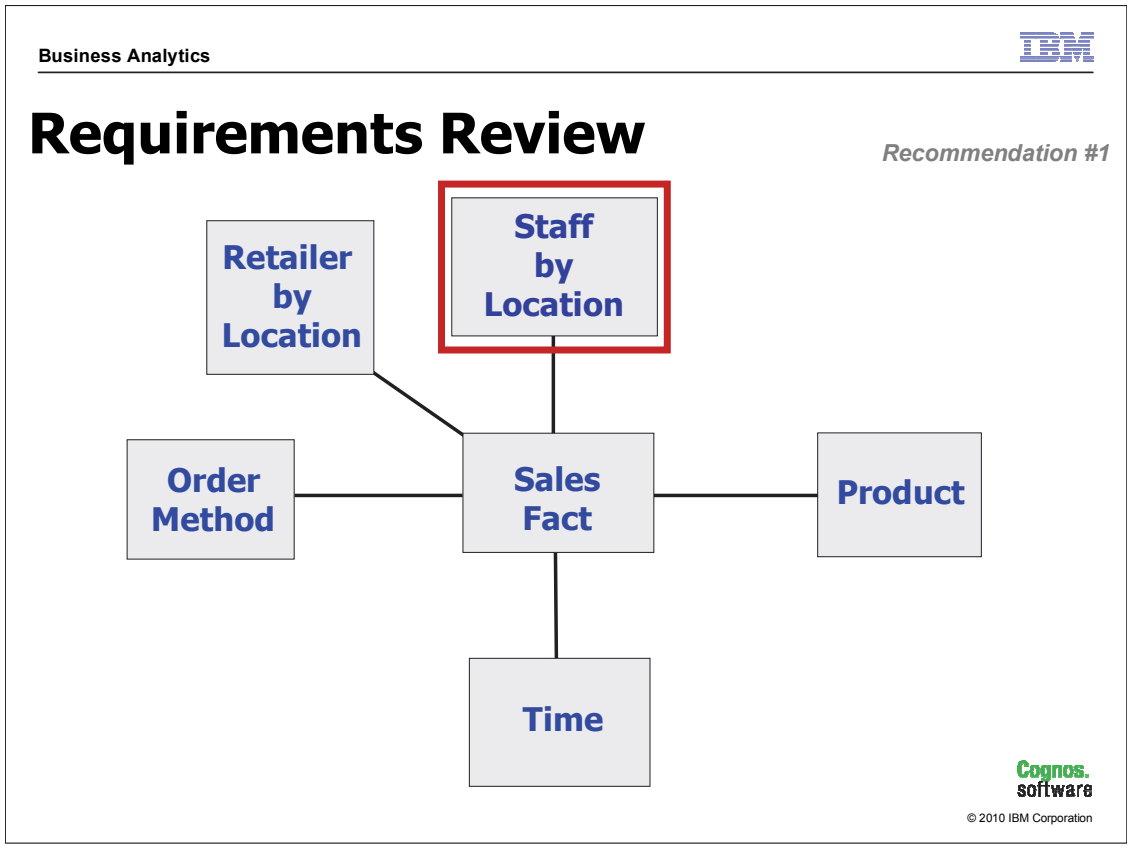
Results:
You have verified the reporting capabilities of your new project by publishing a package from it and using the package to view data in Business Insight Advanced.

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When importing additional metadata from the same data source or another compatible data source (primary and foreign keys match), select Both in the wizard. This generates relationships among the objects being imported as well as the existing objects in the model. By selecting this option, you will not need to create the relationships manually after import.

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In the next demo, you will import metadata to satisfy the highlighted reporting requirement above. The database tables used to satisfy this requirement are as follows:

Reporting Requirement	Database Tables
Staff by Location	BRANCH COUNTRY SALES_REGION EMPLOYEE EMPLOYEE_HISTORY POSITION_LOOKUP

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Demo 4: Extend the Model to Add Staff Location Metadata

Purpose:
Now that you have an understanding of the Framework Manager modeling environment and process, you can extend your model to support additional business requirements from report and ad hoc query authors, namely reporting sales by sales staff location.

Component: **Framework Manager**

Project: **GO Operational**

Task 1. Import additional metadata.

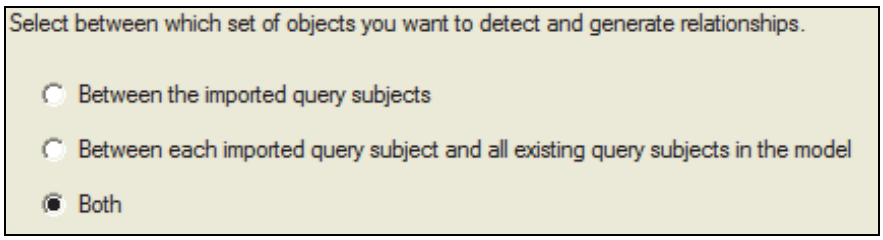
1. In the **Project Viewer**, right-click the **gosales** namespace, and then click **Run Metadata Wizard**.

 You will import more items from the GOSALES database.
2. Ensure that **Data Sources** is selected, and then click **Next**.
3. Ensure that **GOSALES** is selected, and then click **Next**.
4. In the list of objects, expand **GOSALES** and **Tables**, and then select the following tables:
 - **BRANCH**
 - **COUNTRY**
 - **SALES_REGION**
5. Expand **GOSALESHR** and **Tables**, and then select the following tables:
 - **EMPLOYEE**
 - **EMPLOYEE_HISTORY**
 - **POSITION_LOOKUP**.
6. Click **Next**.

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7. On the **Generate Relationships** page, click the **Both** radio button as shown below.



 You want to generate relations among the new query subjects as well as between the new and existing query subjects. This will prevent you from having to manually create the relationships after the import.

8. Click **Import**.

 The import process begins, and then a message appears summarizing the count of objects that were imported.

9. Click **Finish**.

 The gosales namespace now contains a list of query subjects, which represent each of the tables that were imported from the relational database.

10. From the **View** menu, click **Properties**.

11. If necessary, expand the **Data Sources** folder, and then click **GOSALES1**.

 The second data source, GOSALES1, was created for the query subjects you selected from the second schema, gosaleshr.

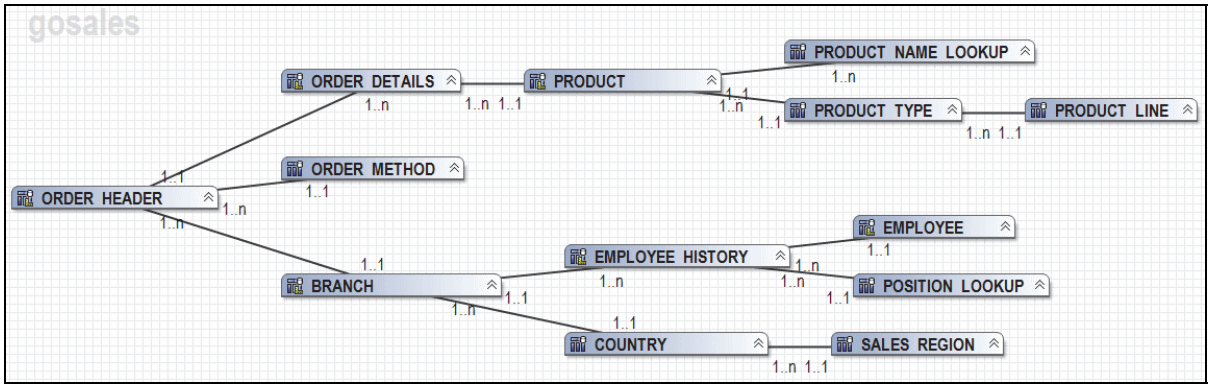
Task 2. Rearrange the diagram.

1. From the **Diagram** menu, and then click **diagram Settings**
2. Under **Level of Details**, deselect **Query Items**, and then click **OK**.
3. Close the **Properties** pane, ensure **Diagram** is selected and then, from the toolbar, click **Auto Layout** .

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4. Beside **Layout Style**, ensure that **Standard** is selected, and then set both **Horizontal** and **Vertical** distances to **30**, click **Apply**, and then click **Close**.

 The results appear as follows:



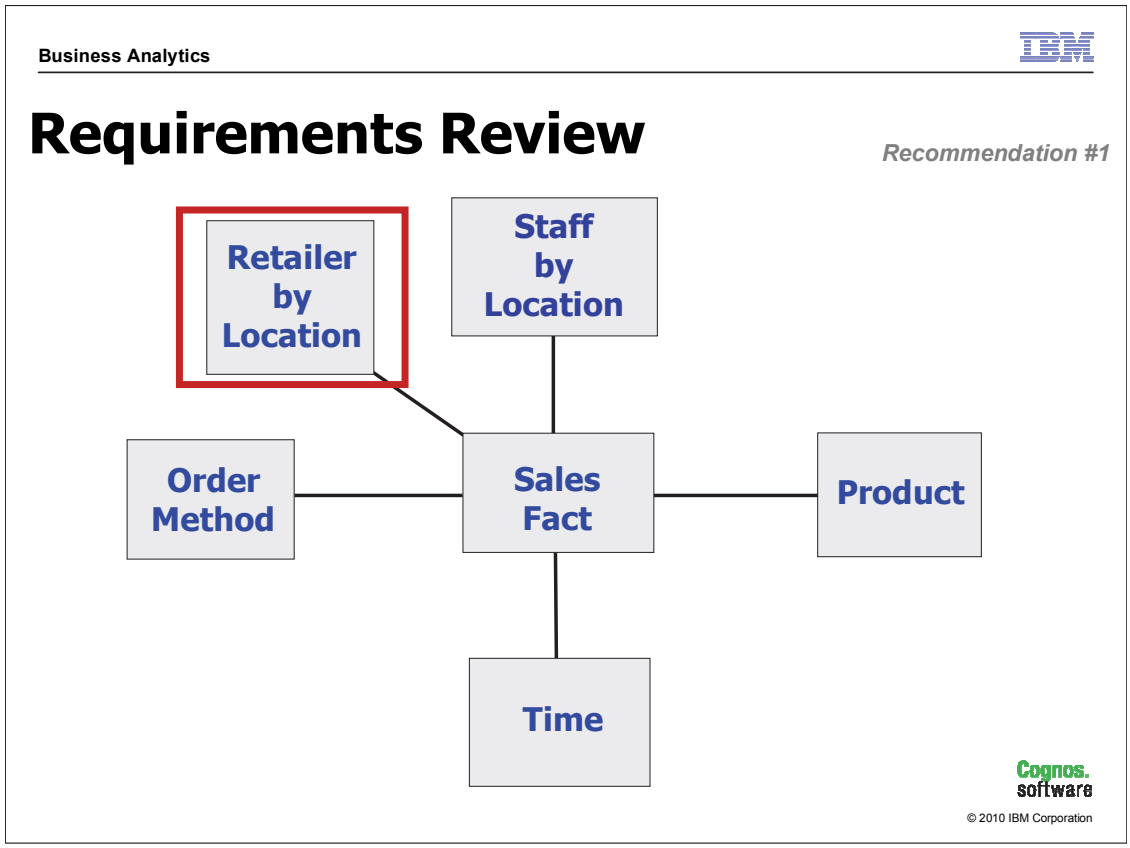
 You can now view all the items imported into your project in a simplified way by reducing the detail and adjusting the space between the objects.

 If you were importing a star schema structure, you would select the Star option under Layout Style to set fact query subjects as focal points with their related dimensions surrounding them.

 You will identify and correct any missing relationships in the next module.

Results:
You extended the model to support additional business requirements for report and ad hoc query authors by importing metadata to support sales staff location queries.

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In the next workshop, you will import metadata to satisfy the highlighted reporting requirement above. The database tables used to satisfy this requirement are as follows:

Reporting Requirement	Database Tables
Retailer	RETAILER RETAILER_SITE RETAILER_TYPE

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Workshop 1: Enhance the Model to Add Retailer Data

Business analysts at The Great Outdoors Company have additional reporting requirements that need to be met. They want to report on sales by retailer.

Retailer information is supported by the following tables in the data source:

- **RETAILER**
- **RETAILER_SITE**
- **RETAILER_TYPE**

Import these query subjects, and then rearrange the diagram to show all query subjects.

Use the Test tool in Framework Manager to verify that you can report on the new data.

For more detailed information outlined as tasks, see the Task Table section on the next page.

For the final query results, see the Workshop Results section that follows the Task Table section.

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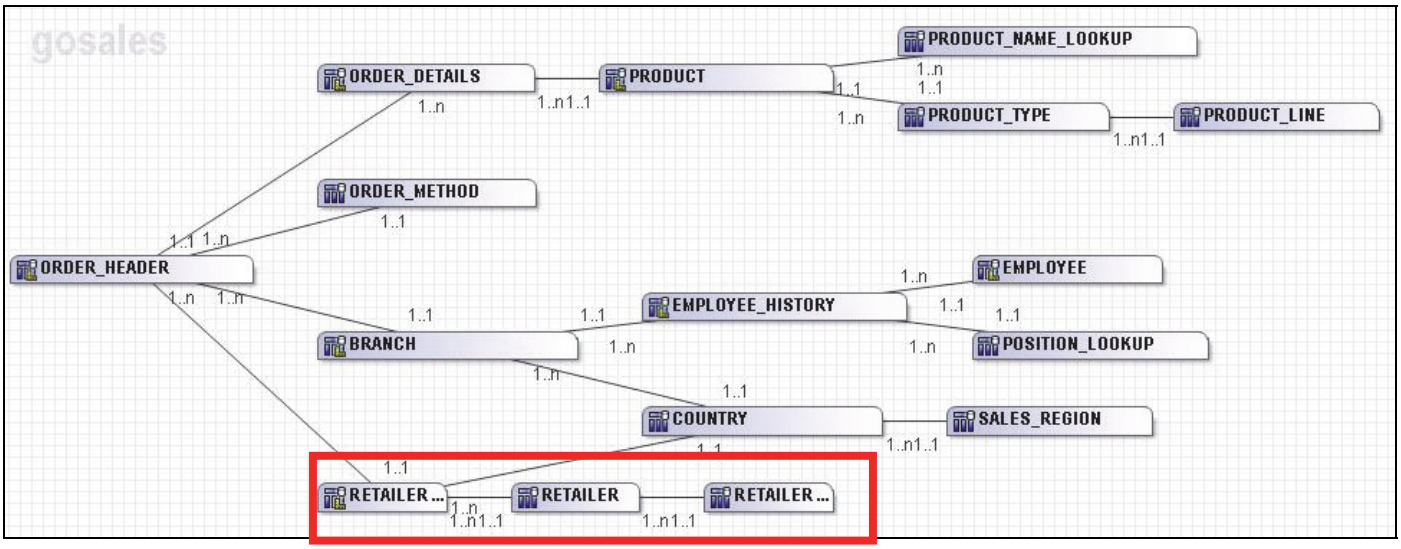
Workshop 1: Task Table

Task	Where to Work	Hints
1. Import metadata.	From gosales namespace, Run Metadata Wizard	• Data Source = GOSALES • Schema = GOSALESRT • Tables = RETAILER, RETAILER_SITE, RETAILER_TYPE • Generate relationships: Both
2. Organize the entity relationship diagram.	Center pane, Diagram setting	• Use Auto Layout with distances of 30
3. Test that you have access to the new data.	Project Viewer	• Select RETAILER.COMPANY_NAME and RETAILER_SITE.RTL_CITY, RETAILER_TYPE.TYPE_NAME_EN • Right-click one of the selected items, click Test, and then click Test Sample
4. Save and close the project.	File menu	• Save • Close the project

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Workshop 1: Workshop Results

The resulting diagram should have the same query subjects and relationships as the following:



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Business Analytics

Summary

- You should now be able to:
 - follow the IBM Cognos and Framework Manager workflow processes
 - define a project and its structure
 - describe the Framework Manager environment
 - create a baseline project
 - enhance the model with additional metadata

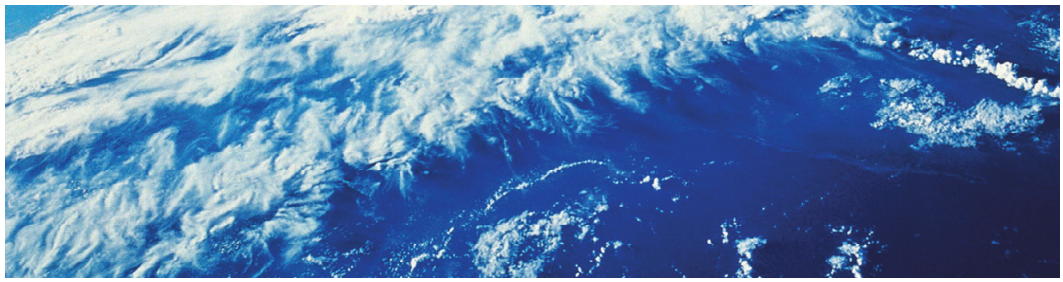
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Prepare Reusable Metadata

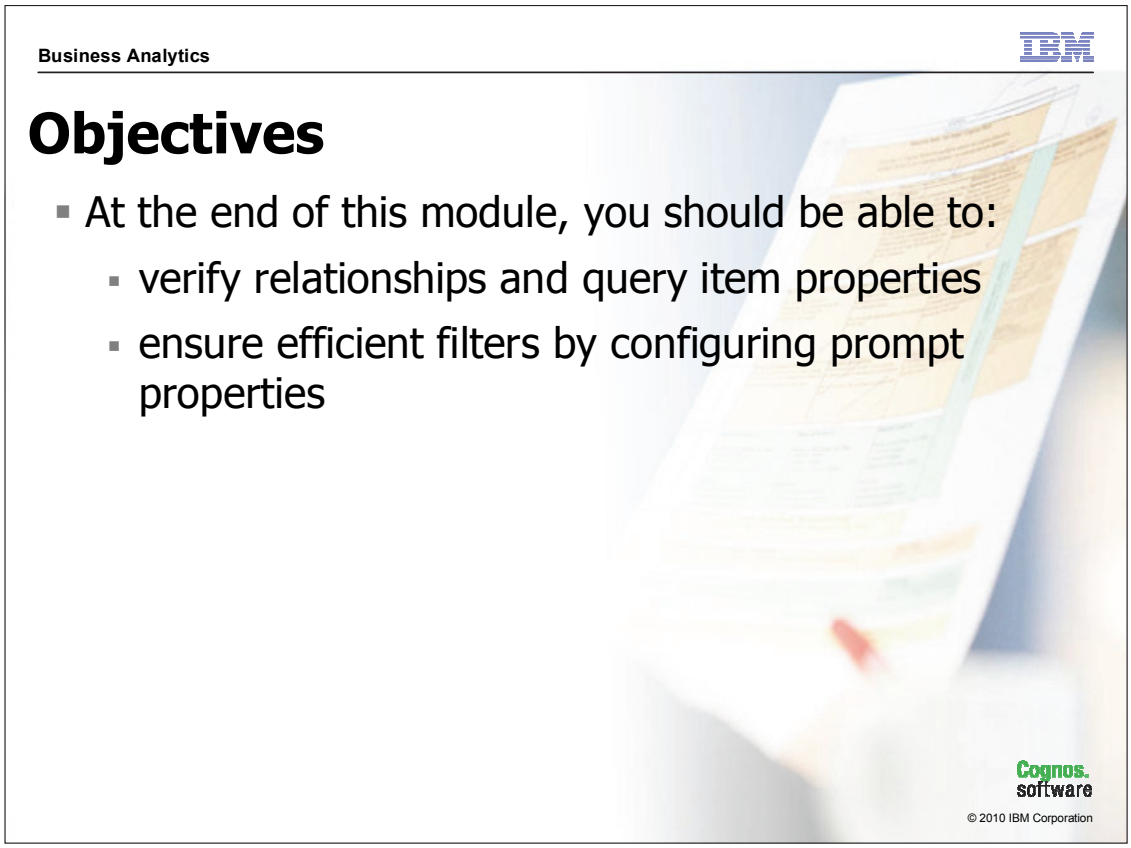
IBM Cognos BI



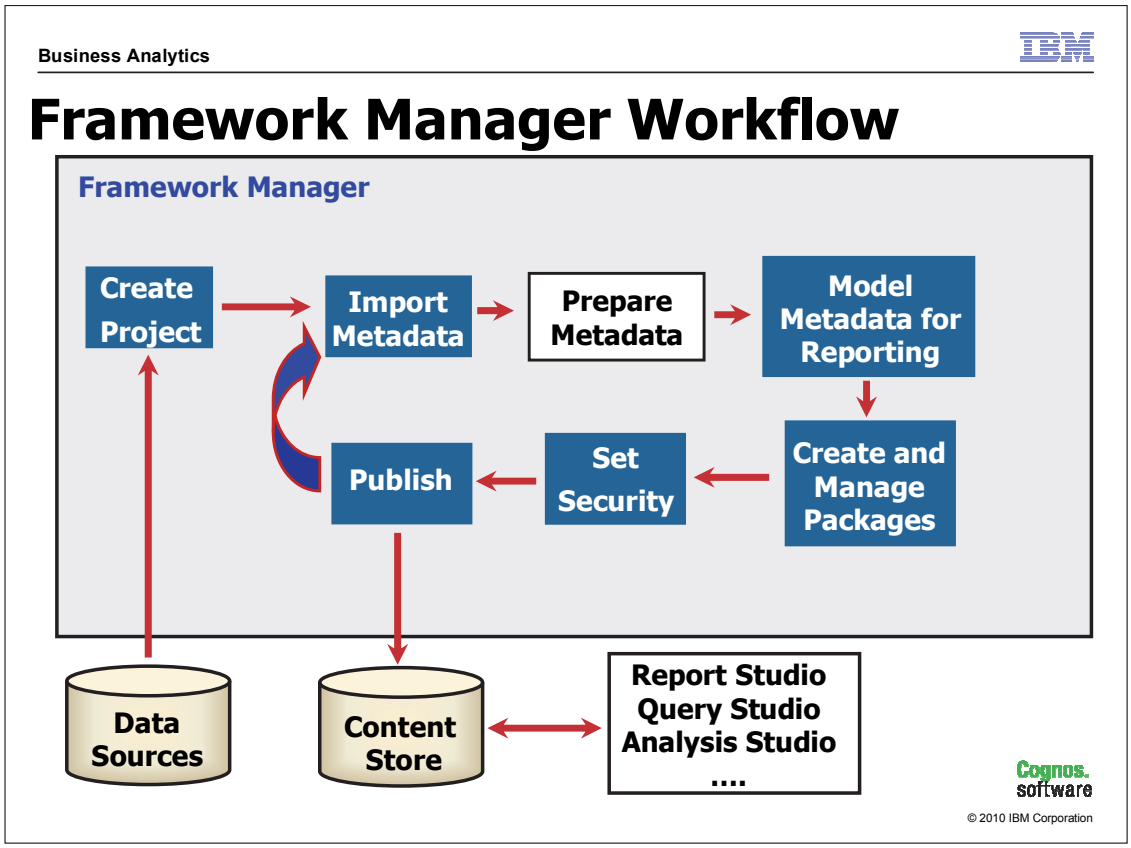
Business Analytics

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The Prepare Metadata phase involves verifying and modifying relationships and object properties and customizing metadata for run time.

These changes can be made either to the original data source query subjects (in the Foundation Objects View), or to the model query subjects (such as those you will create later in the course). Changes to the original data source query subjects are reusable. These query subjects may later be used in several different model query subjects, each of which will inherit the same changes. However, if you do not intend for a modification to be universal, then it should be made in the specific model query subjects that require that change.

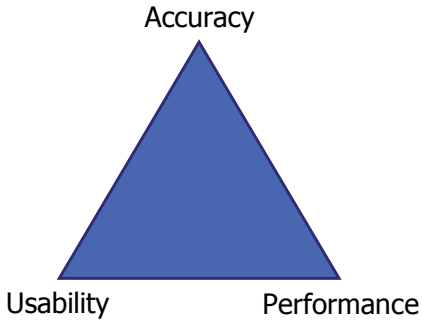
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Business Analytics

Goals of a Data Modeler

Data modelers have 3 main goals:

- **Accuracy:** Reports must contain accurate data. This is the most essential goal.
- **Usability:** Packages must be understandable by report authors and other users.
- **Performance:** Reports must take the least system resources possible.



Usability and performance offer a trade-off.
Modelers can gain usability by sacrificing performance and vice-versa.

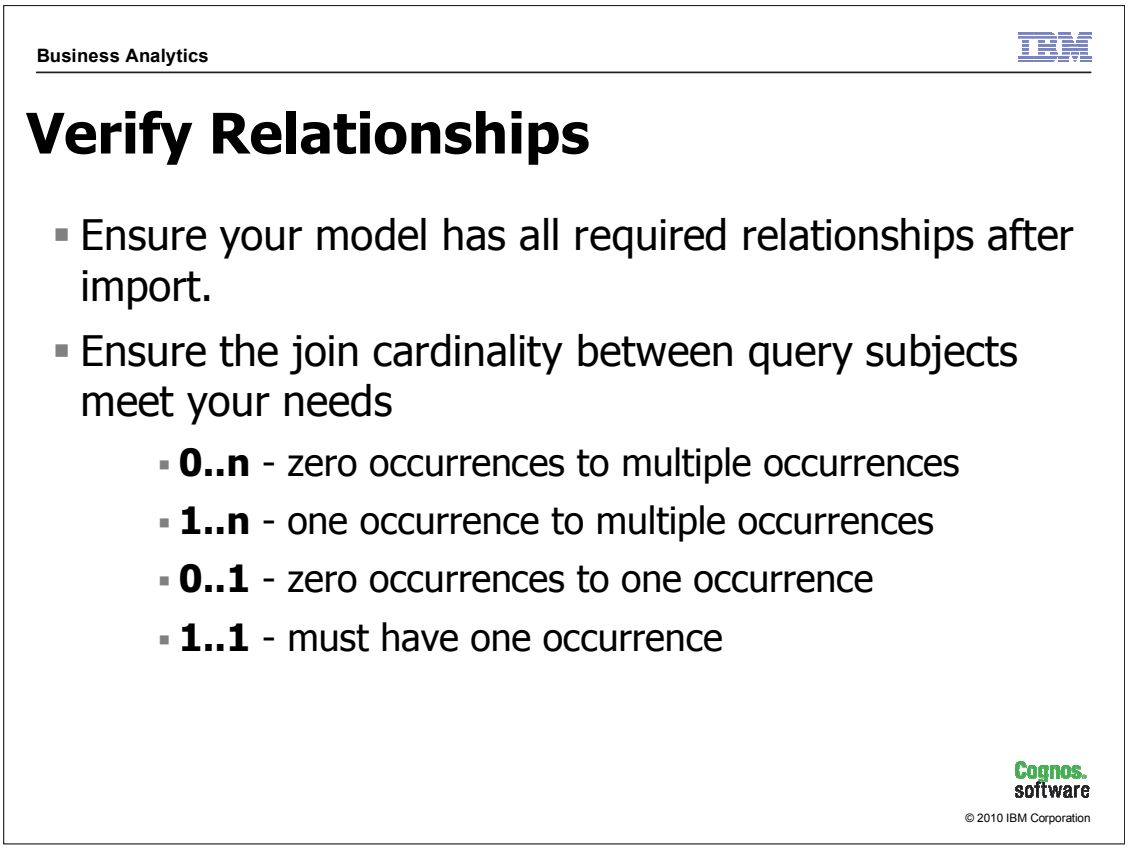
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The goals of the data modeling process can be summarized in three categories:

- **Accuracy:** If the packages created from a model do not produce reports with accurate data, the model is inherently flawed and must be repaired.
- **Usability:** The packages produced from a model must be understandable by those who will use the packages to create reports and perform analysis.
- **Performance:** Data should be retrievable in a reasonable amount of time.

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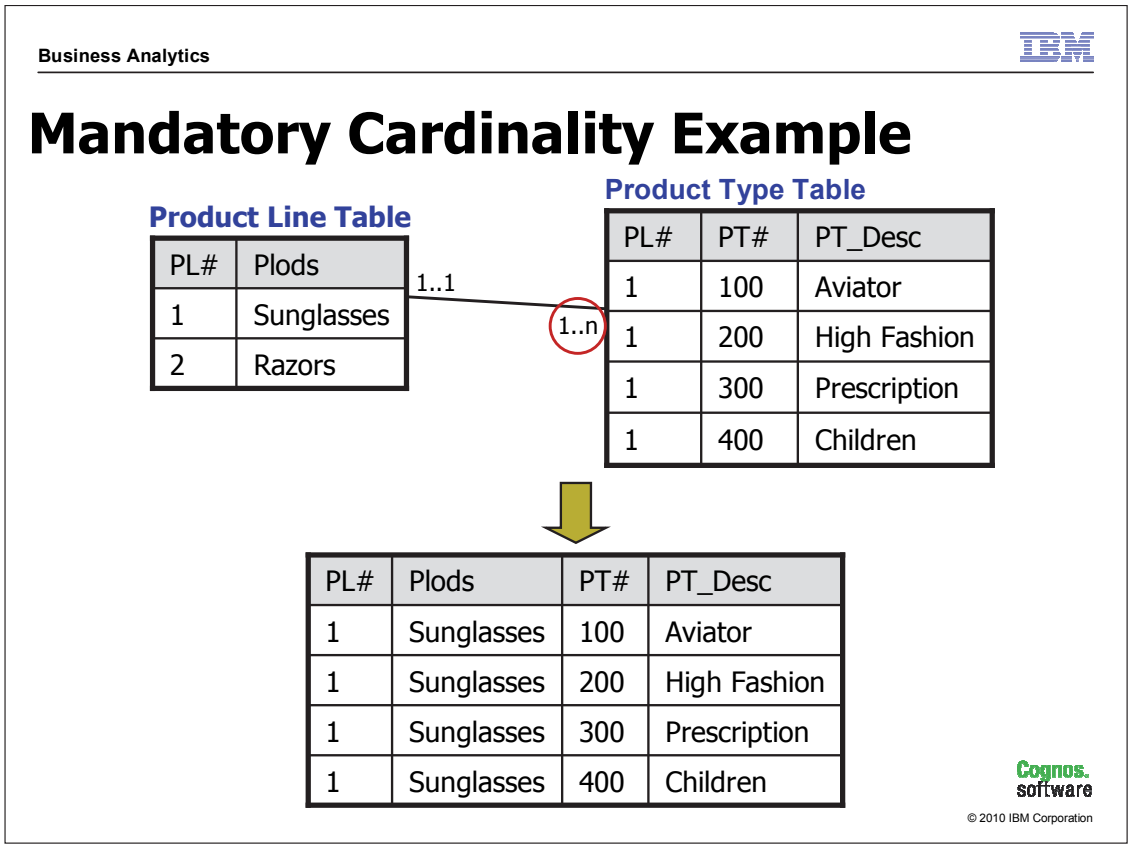


Relationships are maintained in the Object Diagram or Context Explorer.

When verifying your relationships, you must ensure that the appropriate relationships exist to meet your reporting needs and you must decide if you require optional or mandatory cardinalities. Optional cardinalities require more processing, but may be needed to return the desired results.

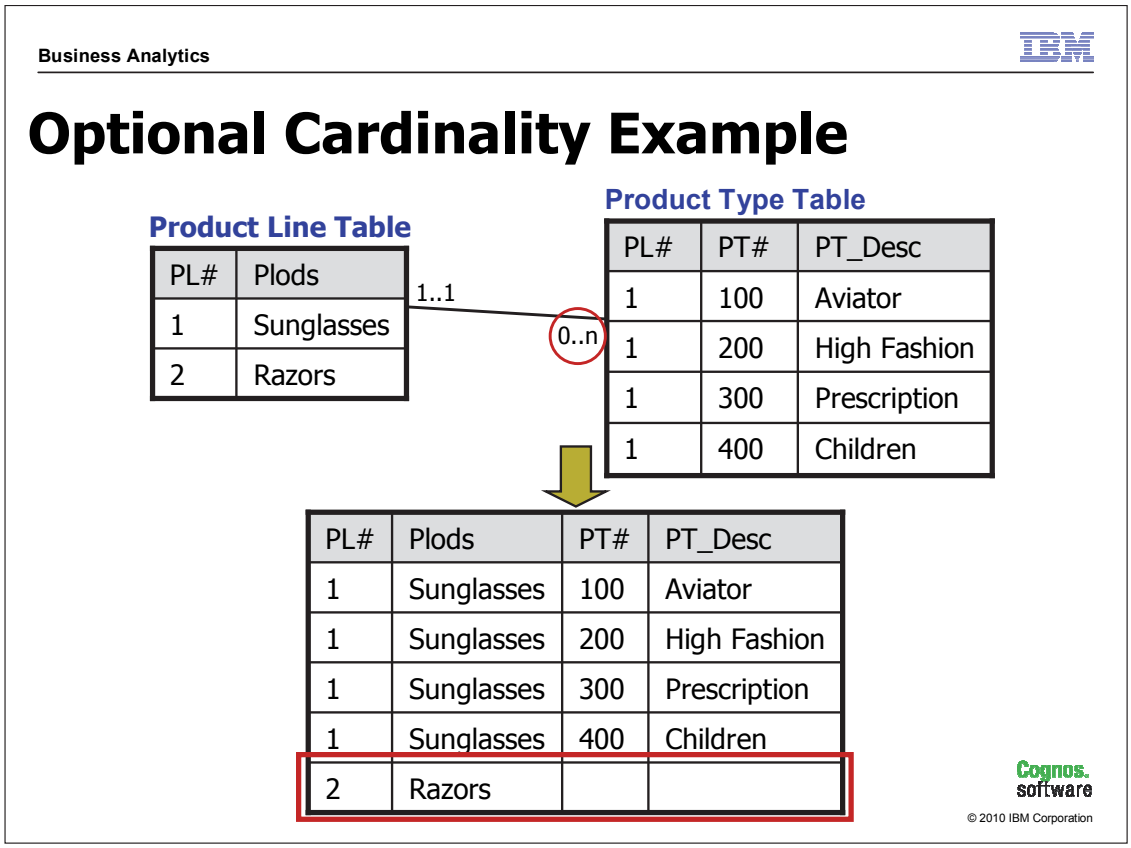
Optional cardinality is represented by a 0 as seen in the 0..n and 0..1 examples.

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In the slide example, only rows in which the join condition is met are returned (where the product line number exists in both tables). The Razors product line is omitted from the record set.

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With the cardinality set to 0..n on the Product Type table, all rows from the Product Line table are returned since a mandatory match in the Product Line table is not required. The Razors product line now appears in the record set.

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Demo 1: Verify Relationships

Purpose:
To meet reporting requirements, you will verify your relationships to ensure none are missing and that the cardinality is set accordingly.

Component: **Framework Manager**

Project: **GO Operational**

Task 1. Examine relationships.

1. In **Framework Manager**, close any open projects, and then open the **GO Operational** project located at **C:\Edcognos\B5152\CBIFM-Start Files\ Module 5\GO Operational**.

 This is the baseline project created in the previous module.

2. Log in as User ID **admin**, and Password **Education1!**, if prompted.
3. In the middle pane, click **Diagram**, and then double-click the **gosales** box to give it focus in the diagram.

 You will increase the level of detail in the diagram to include query items.

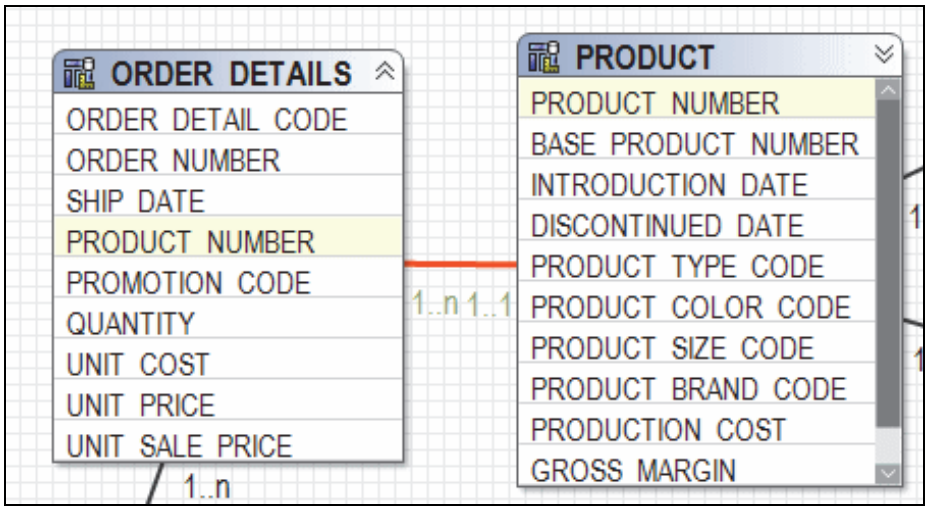
4. From the **Diagram** menu, click **Diagram settings**, select **Query Items**, and then click **OK**.
5. Using the **Auto Layout** dialog box, set the horizontal and vertical distance to **25** to increase the distance between objects.

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6. Click the relationship between **ORDER_DETAILS** and **PRODUCT**.

The results appear as follows:

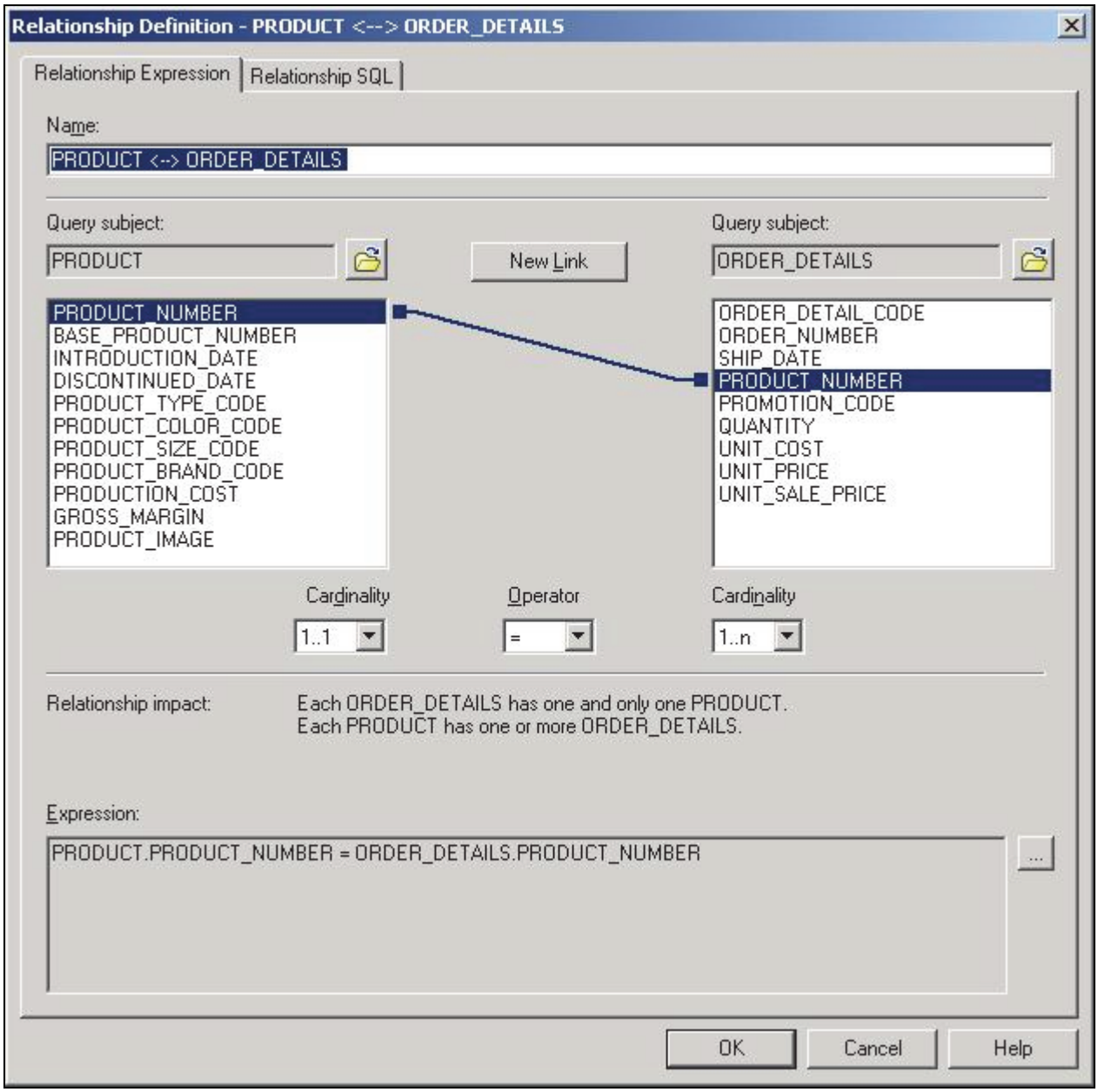


The relationship line turns red and the query items used in the join are highlighted, in this case PRODUCT_NUMBER.

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7. Double-click the relationship.

 The results appear as follows:

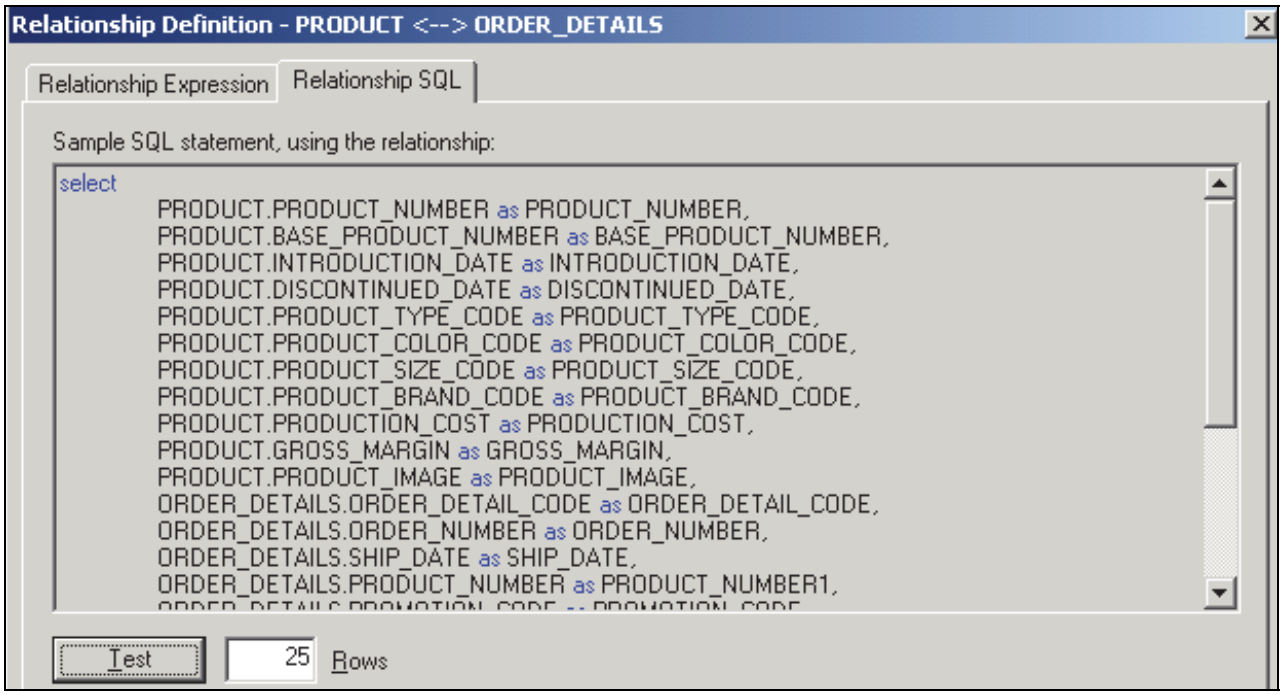


Here you can configure the relationship as required. You can change the query items used in the join, the cardinality settings, the operator, or edit the expression to create a more complex join.

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8. Click the **Relationship SQL** tab.

 The results appear as follows:



 Here you can view the SQL that is generated to join these two query subjects together and can test the items returned by the join.

9. Click **Cancel**.

10. In the bottom right corner of the diagram, click **Diagram Overview** .

11. Drag the red viewing window to view all parts of the diagram.

 This feature is useful when dealing with larger models.

 You can see that all query subjects are linked to at least one other query subject, and that most relationships are one-to-many. You will examine one relationship in detail.

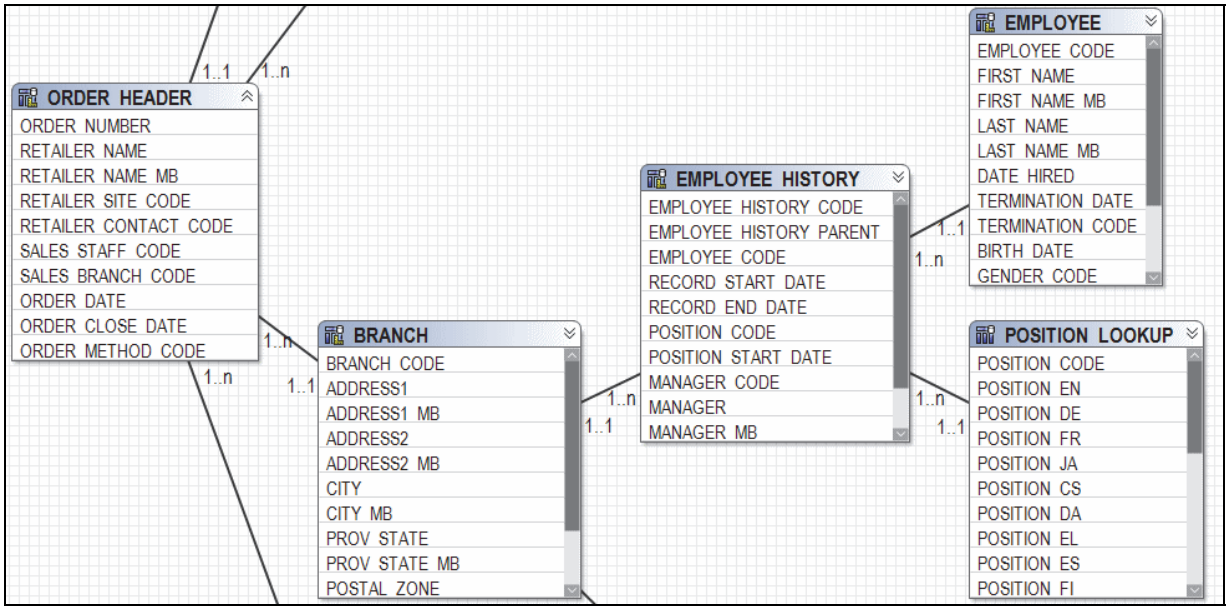
12. Close the **Diagram Overview** window.

 It is recommended that you examine each relationship to verify that it is the relationship required for reporting purposes (with the appropriate cardinality) and make note of any missing relationships, where issues might occur, or items may need to be revisited.

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Task 2. Identify missing relationships.

1. Examine the portion of the diagram below:



EMPLOYEE is joined to EMPLOYEE_HISTORY in a one-to-many relationship, allowing you to report on past positions. You will test this in the next task. BRANCH is also joined to EMPLOYEE_HISTORY in a one-to-many relationship. In this scenario EMPLOYEE_HISTORY is acting as a "bridge" table in a many-to-many relationship between BRANCH and EMPLOYEE. An employee may have worked in several branches and a branch may have several employees.

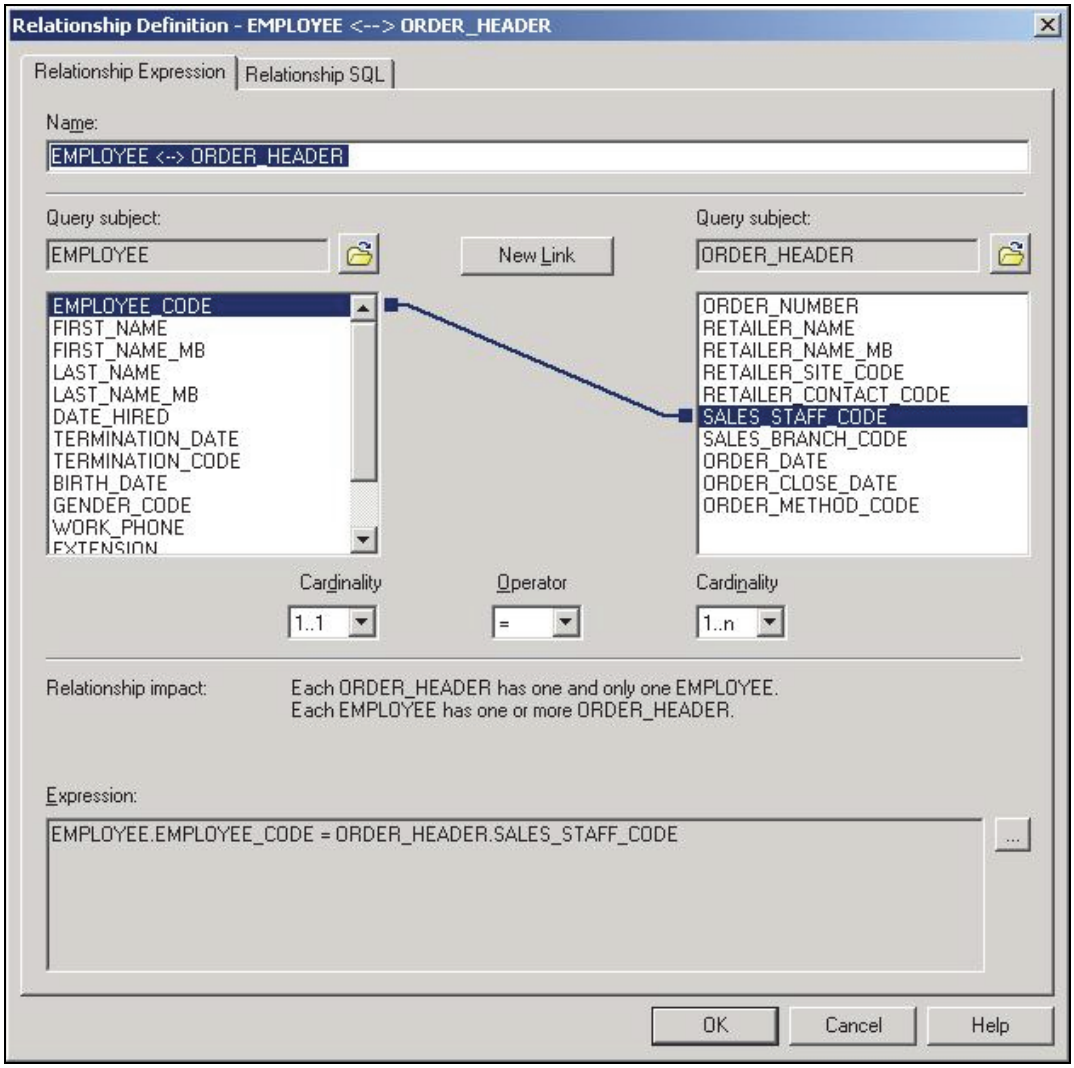
BRANCH has a relationship to ORDER_HEADER that indicates which branch made a sale. EMPLOYEE does not have a relationship to ORDER_HEADER. In this state, you cannot report on sales by staff, which is one of the requirements. EMPLOYEE needs a relationship to ORDER_HEADER.

In speaking with the database modeler, you discover that the relationship between the two objects should be EMPLOYEE.EMPLOYEE_CODE to ORDER_HEADER.SALES_STAFF_CODE. The names are different, but they do in fact represent the same information.

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2. In the diagram, Ctrl+click **EMPLOYEE.EMPLOYEE_CODE** and **ORDER_HEADER.SALES_STAFF_CODE**.
3. Right-click one of the selected items, point to **Create**, and then click **Relationship**.

 The results appear as follows:



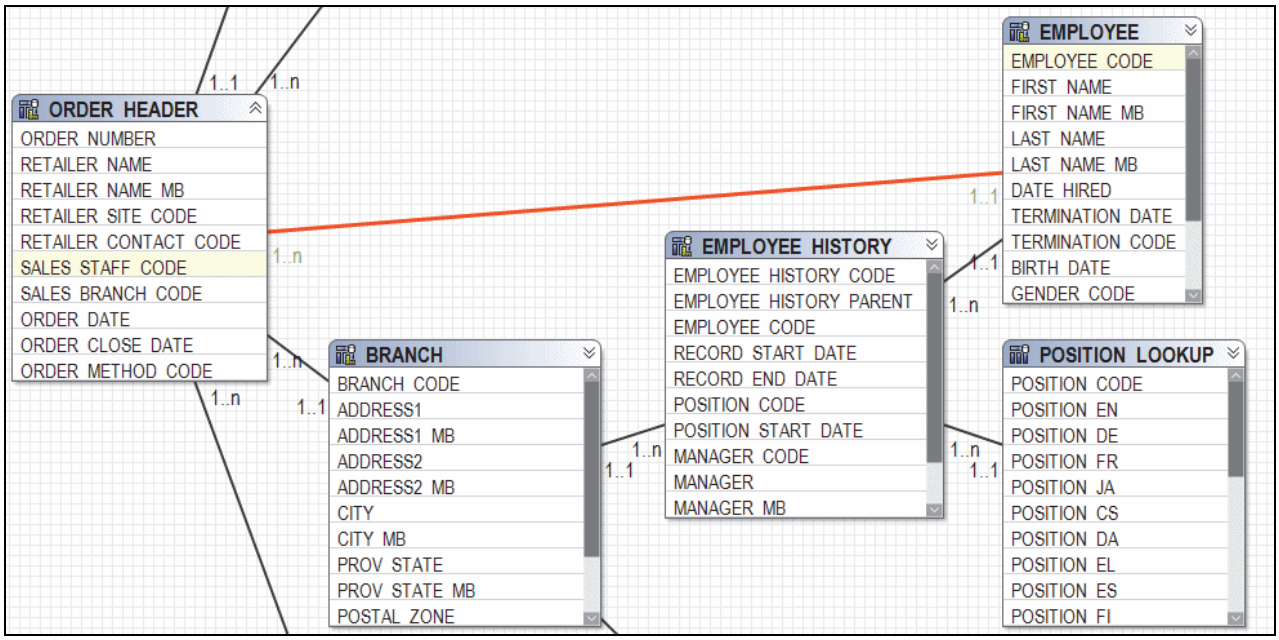
A relationship with the selected query items and appropriate cardinality is created.

Note: When creating a relationship with this method, the query item selected first will be on the 1..1 side and the second query item will be on the 1..n side.

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4. Click **OK**.

The results appear as follows:



At this point, you are just ensuring that all required relationships are in place. Refining the model for presentation and predictable results will occur later in the modeling process.

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Task 4. Test relationships.

You will now test one relationship to help you understand the data as well as test the new relationship you just created.

1. In the diagram, scroll down in **EMPLOYEE_HISTORY** until you can see **BRANCH_CODE**, and then select the following query items:

Query Subject	Query Item
EMPLOYEE	**FIRST_NAME** **LAST_NAME**
EMPLOYEE_HISTORY	**RECORD_START_DATE** **RECORD_END_DATE** **MANAGER** **BRANCH_CODE**
POSITION_LOOKUP	**POSITION_EN**

2. Right-click one of the selected items, click **Test**, and then click **Test Sample**.
3. Scroll down until you see **Maria Iacobucci**.

 The results appear as follows:

Test results

FIRST_NAME	LAST_NAME	RECORD_START_DATE	RECORD_END_DATE
Silvano	Allessori	Jun 27, 2006 12:00:00 AM	
Maria	Iacobucci	Mar 25, 2002 12:00:00 AM	Apr 4, 2005 12:00:00 AM
Maria	Iacobucci	Apr 5, 2005 12:00:00 AM	
Alessandra	Torta	Dec 15, 2003 12:00:00 AM	

 You can see that Maria changed managers (perhaps moving to a different part of the organization, but within the same branch).

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4. Click **Close**.

 You will now test the new relationship between EMPLOYEE and ORDER_HEADER.

5. In the diagram, test the following query items:

Query Subject	Query Item
EMPLOYEE	**FIRST_NAME** **LAST_NAME** **EMPLOYEE_CODE**
ORDER_HEADER	**SALES_STAFF_CODE**
ORDER_DETAILS	**QUANTITY**

The results appear as follows:

Test results

FIRST_NAME	LAST_NAME	EMPLOYEE_CODE	SALES_STAFF_CODE	QUANTITY
Margaret	Lewiston	10068	10068	68
Rhonda	Cummings	10056	10056	27
Rhonda	Cummings	10056	10056	46
Rhonda	Cummings	10056	10056	43
Rhonda	Cummings	10056	10056	137
Rhonda	Cummings	10056	10056	48
Rhonda	Cummings	10056	10056	920

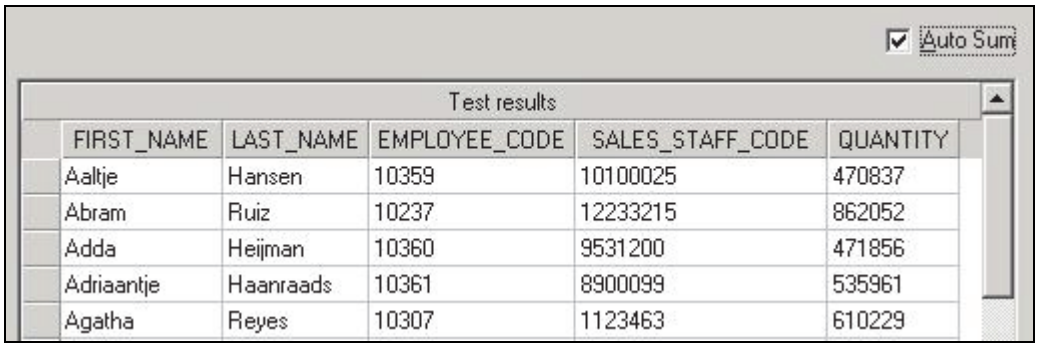
You can see that the EMPLOYEE_CODE values and SALES_STAFF_CODE values do match. If you would like to see how many items an employee sold overall, you can test with Auto Sum enabled.

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6. Select **Auto Sum**, and then click **Test Sample** again.

 The results appear as follows:



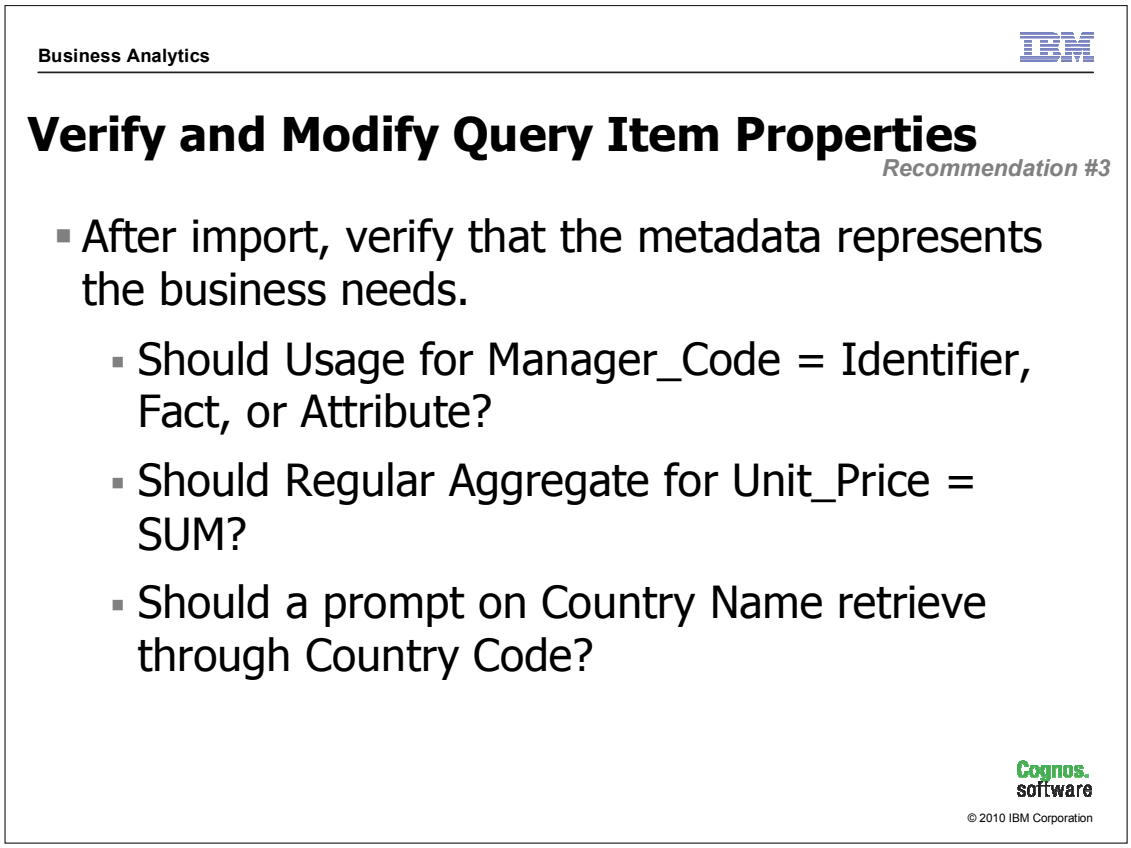
FIRST_NAME	LAST_NAME	EMPLOYEE_CODE	SALES_STAFF_CODE	QUANTITY
Aaltje	Hansen	10359	10100025	470837
Abram	Ruiz	10237	12233215	862052
Adda	Heijman	10360	9531200	471856
Adriaantje	Haanraads	10361	8900099	535961
Agatha	Reyes	10307	1123463	610229

 Quantity is now summed for each employee. The relationship is working as expected. However, notice the SALES_STAFF_CODE value. It seems to have been summed as well. This is because it was set as an integer during import. You will examine and fix this issue in the next demo.

7. Click **Close**, click **Save**, and keep **Framework Manager** open for the next demo.

Results:
To meet reporting requirements, you verified your relationships and added a missing relationship.

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Facts are numeric or time-interval, non-indexed columns. Identifiers are key, index, date, datetime, or any indexed columns. Attributes are typically strings.

The Regular Aggregate property for numeric facts (measures) defaults to SUM, which is correct for most measures (such as REVENUE and QUANTITY). However a report identifying four tents sold to a customer would probably not display the sum of their prices, but instead the average.

Take advantage of Prompt properties to improve performance by causing automatic retrieval through indexes.

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Demo 2: Verify and Modify Query Item Properties

Purpose:
To meet reporting requirements, you will verify that important query item properties, such as Usage and Regular Aggregate, are correct. You will also ensure efficient queries using filters by configuring query items to use an indexed key value rather than a non-indexed string value in the filter.

Components: **Framework Manager, Query Studio, Report Studio**

Project: **GO Operational**

Package: **GO Operational**

Task 1. Verify Usage property settings.

1. If necessary, from the **View** menu, click **Properties** to view the **Properties** pane.
2. In the **Project Viewer**, expand **ORDER_HEADER**, and then click **ORDER_NUMBER**.

 Both the query item icon  and the Usage property field tell us that ORDER_NUMBER is an identifier, and were identified as such during import since this is the primary key in the database table.

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3. Click **SALES_STAFF_CODE**.

 In comparison, SALES_STAFF_CODE has a measure icon (also known as a Fact)  and its Usage property is set to Fact. This was specified during the import because it is a non-indexed numeric field in the database. You know that this query item is not a measure. It is used for associating several employees to an order. You will set this query item's Usage property to Attribute. If you know that any item would be used in relationships or that report authors would filter on an item regularly, you would ask the database administrator to index the field in the database. At that point you would set the Usage property to Identifier. For now, you will set SALES_STAFF_CODE as Attribute to indicate to yourself and other modelers that this integer field is not indexed in the database.

4. In the **Properties** pane, click the **Usage** property, and then select **Attribute** from the list.

 You will now change multiple properties at once to correct other items incorrectly set as facts.

5. Under **ORDER_HEADER**, select the following items:

 - **RETAILER_SITE_CODE_**
 - **RETAILER_CONTACT_CODE**
 - **SALES_BRANCH_CODE**

6. In the **Properties** pane, in the **RETAILER_SITE_CODE** row, scroll to the right, click **Fact** below the **Usage** heading, and then select **Attribute** from the list.

7. Drag the small black arrow beneath the value downward to change the values to **Attribute** for the other two query items.

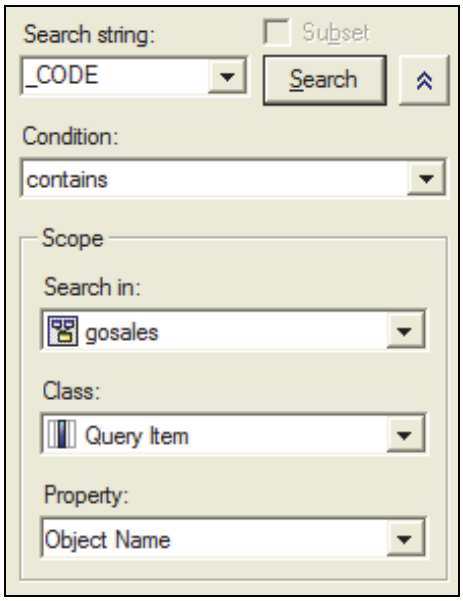
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Task 2. Use Bulk Replace to change property settings.

Rather than go through each query subject and manually change the Usage setting for codes from Fact to Attribute, you can use the Search tool to perform bulk changes.

1. If necessary, from the **View** menu, click **Tools**.
2. In the **Tools** pane, click the **Search** tab, and then in the **Search string** box, type **_CODE**.
3. Beside the **Search** button, click  to see additional search options.
4. Select the following configuration:

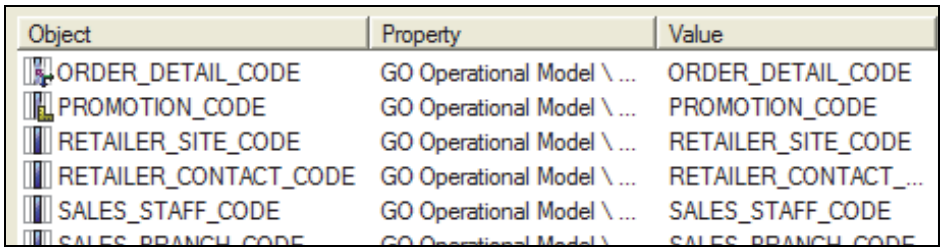


This will confine your search to the gosales namespace, only look at query items, and only look at name properties containing the string _CODE.

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5. Click **Search**, and then, if necessary, resize the Tools pane to view the results.

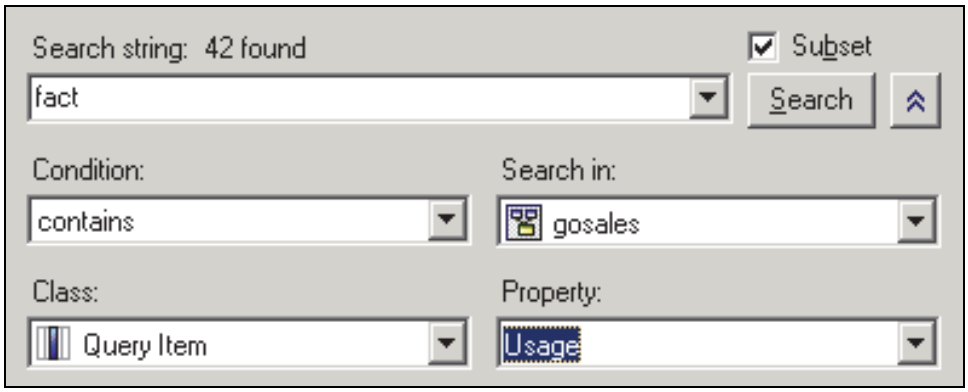
 The results appear as follows:



 You will search a subset of this result set to display only items whose Usage property is set to Fact.

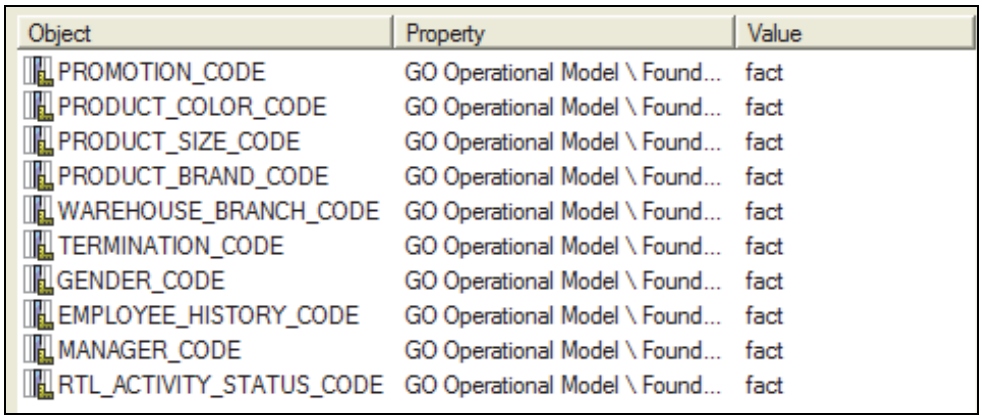
6. Select the **Subset** check box, in the **Search string** box, type **fact**, and then change the **Property** selection to **Usage**.

 The results appear as follows:



7. Click **Search**.

 The results appear as follows:

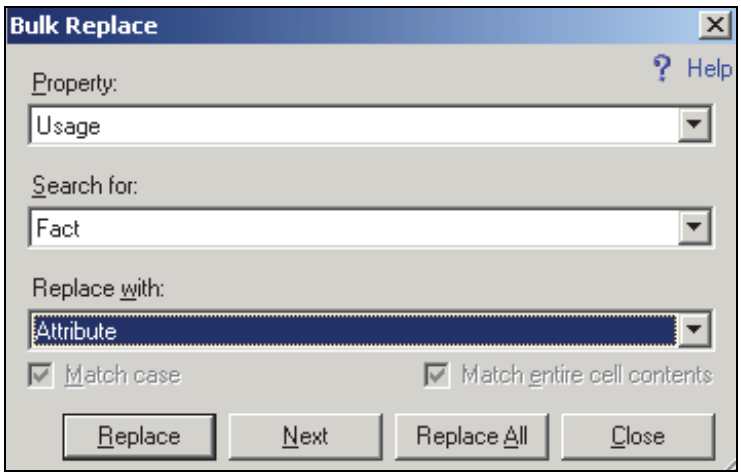


 You will now use the Bulk Replace feature to change the Usage property for these items to Attribute.

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8. In the bottom right corner of the **Tools** pane, click **Bulk Replace**.
9. Under **Replace with**, select **Attribute**.

 The results appear as follows:



10. Click **Replace All**, and then click **Yes**.

 The results appear as follows:

Object	Property	Value
PROMOTION_CODE	GO Operational Model \ Found...	attribute
PRODUCT_COLOR_CODE	GO Operational Model \ Found...	attribute
PRODUCT_SIZE_CODE	GO Operational Model \ Found...	attribute
PRODUCT_BRAND_CODE	GO Operational Model \ Found...	attribute
WAREHOUSE_BRANCH_CODE	GO Operational Model \ Found...	attribute
TERMINATION_CODE	GO Operational Model \ Found...	attribute
GENDER_CODE	GO Operational Model \ Found...	attribute
EMPLOYEE_HISTORY_CODE	GO Operational Model \ Found...	attribute
MANAGER_CODE	GO Operational Model \ Found...	attribute
RTL_ACTIVITY_STATUS_CODE	GO Operational Model \ Found...	attribute

All Usage properties are now changed to attribute.

Using the Search tool can save a lot of time when performing these types of tasks. However, you should still examine all query items to ensure the settings are correct. For example, PRODUCT_BASE_NUMBER from PRODUCT and EMPLOYEE_HISTORY_PARENT from EMPLOYEE_HISTORY are still identified as facts. The search did not catch these since they did not contain the string _CODE.

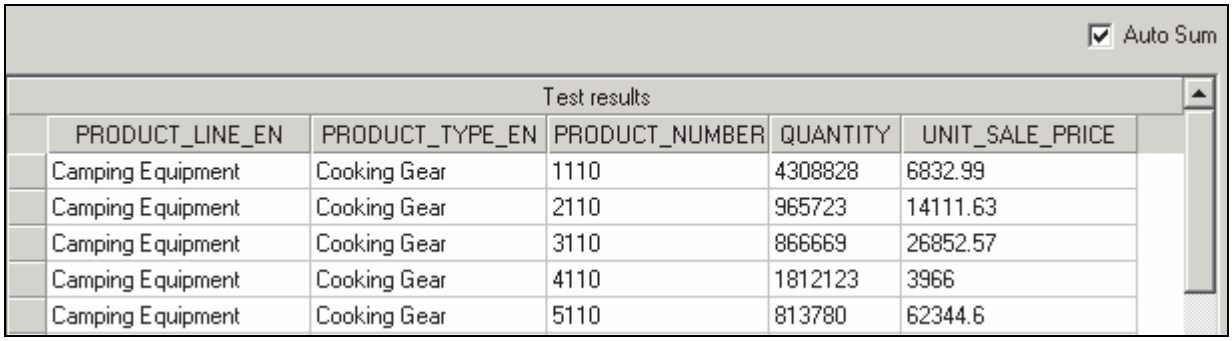
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Task 3. Verify Regular Aggregate property settings.

1. Select and test the following query items with **Auto Sum** enabled:

Query Subject	Query Item
PRODUCT_LINE	**PRODUCT_LINE_EN**
PRODUCT_TYPE	**PRODUCT_TYPE_EN**
PRODUCT	**PRODUCT_NUMBER**
ORDER_DETAILS	**QUANTITY** **UNIT_SALE_PRICE**

The results appear as follows:



PRODUCT_LINE_EN	PRODUCT_TYPE_EN	PRODUCT_NUMBER	QUANTITY	UNIT_SALE_PRICE
Camping Equipment	Cooking Gear	1110	4308828	6832.99
Camping Equipment	Cooking Gear	2110	965723	14111.63
Camping Equipment	Cooking Gear	3110	866669	26852.57
Camping Equipment	Cooking Gear	4110	1812123	3966
Camping Equipment	Cooking Gear	5110	813780	62344.6

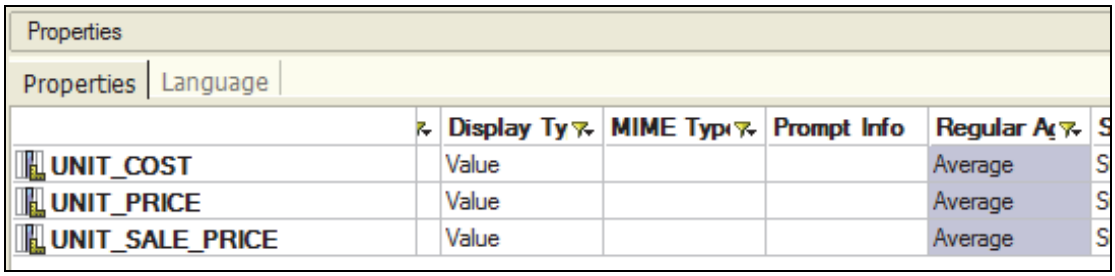
Notice UNIT_SALE_PRICE is summed. This does not meet the reporting requirements. In a report on ORDER_DETAILS rolled up for each product you would expect the QUANTITY to be summed, but it would make no sense to sum up the UNIT_SALE_PRICE (the sale price for one unit of each product in the order), since you may have sold several units in one order detail. You will change this aggregation to default to something more useful. In this case, Average. The same situation applies to UNIT_COST and UNIT_PRICE. (Later in the course, you will create a Revenue calculation, QUANTITY * UNIT_SALE_PRICE.)

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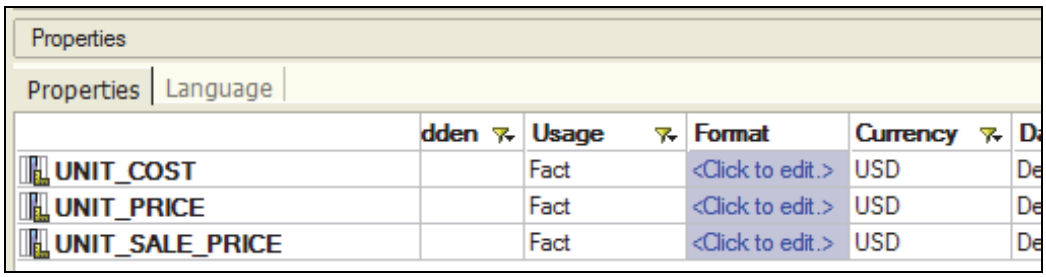
2. Click **Close**, and then in the **Project Viewer**, under **ORDER_DETAILS**, select the following items:
 - **UNIT_COST**
 - **UNIT_PRICE**
 - **UNIT_SALE_PRICE**
3. Using the method shown in Task 1, change the **Regular Aggregate** property value to **Average** for all the items.

 The results appear as follows:



 You will change the format for these objects to $USD Currency.
4. In the **UNIT_COST** row, click on **<Click to edit.>** under the **Format** heading.
5. Under **Format Type**, select **Currency**, and then in the **Properties** pane, change **Currency** to **$(USD) - United States of America, dollar**.
6. Click **OK**, drag the small **black arrow** down to change the property setting for the other two items, and then on the message, click **OK**.

 The results appear as follows:



7. Save the project.

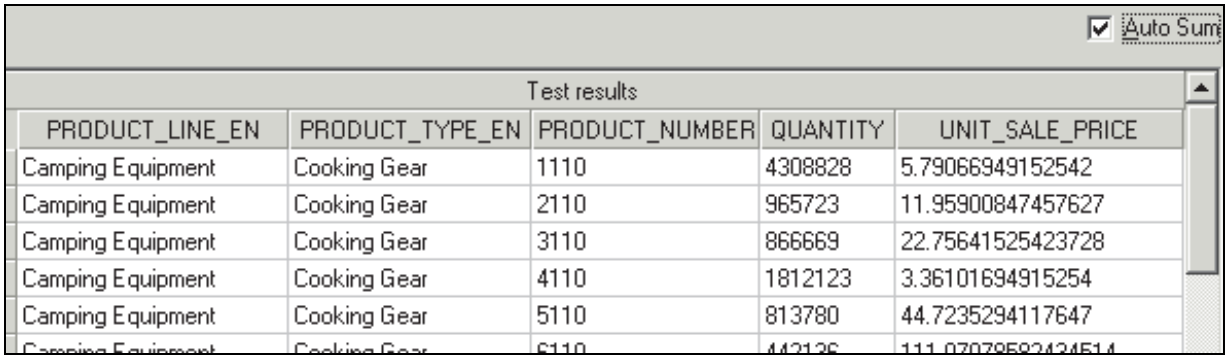
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Task 4. Test property changes in Framework Manager.

1. Select and test the following query items with **Auto Sum** enabled:

Query Subject	Query Item
PRODUCT_LINE	**PRODUCT_LINE_EN**
PRODUCT_TYPE	**PRODUCT_TYPE_EN**
PRODUCT	**PRODUCT_NUMBER**
ORDER_DETAILS	**QUANTITY** **UNIT_SALE_PRICE**

The results appear as follows:



QUANTITY has been summed while UNIT_SALE_PRICE has been averaged. This is based on the property setting you specified earlier.

2. Click **Close**.

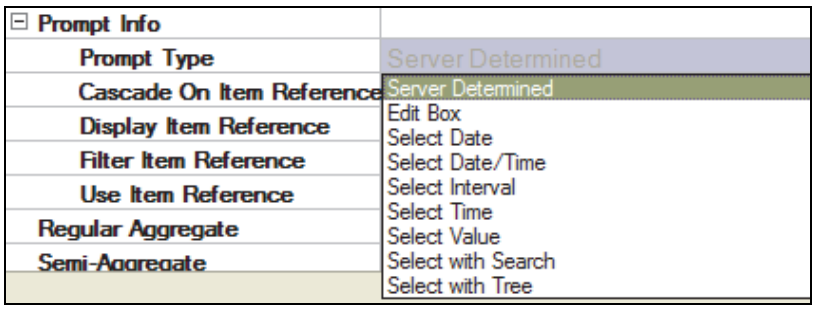
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Task 5. Adjust Prompt properties.

1. In the **Project Viewer**, under **PRODUCT_LINE** select **PRODUCT_LINE_EN**.
2. In the **Properties** pane, scroll down and expand **Prompt Info**.
3. View the options in the drop down list to the right of **Prompt Type**.

 The results appear as follows:



 You can specify the type of prompt that you want generated in Query Studio or the default prompt type for Report Studio. The default is for the server to determine the prompt type based on data type.

 Here is a brief description of the other properties:

 Cascade on Item Reference is for cascading prompts in Report Studio, for example, where the list of Product Type choices is restricted to those within a selected Product Line.

 Display Item Reference identifies the default value that a manually created Report Studio prompt will display for a particular query item. For example, to see a list of PRODUCT_LINE_EN names when using PRODUCT_LINE_CODE in a prompt, set the Display Item Reference property for PRODUCT_LINE_CODE to PRODUCT_LINE_EN. If this field is left blank, it will default to the values returned by query item to which it belongs.

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Use Item Reference identifies the default value that a manually created Report Studio prompt will use in the query's filter. For example, for a Report Studio generated prompt on PRODUCT_LINE_EN to display a list of PRODUCT_LINE_EN names but retrieve data through the PRODUCT_LINE_CODE, set the Use Item Reference property in PRODUCT_LINE_EN to PRODUCT_LINE_CODE.

Filter Item Reference identifies the value that an IBM Cognos 10 generated prompt will use to filter your query. For example, for Query Studio to display PRODUCT_LINE_EN values but use PRODUCT_LINE_CODE in the query's filter, set the Filter Item Reference property to PRODUCT_LINE_CODE.

You will set prompt properties on PRODUCT_LINE_EN and PRODUCT_TYPE_EN so that they use appropriate indexes in any prompt situation to retrieve values from the database. To achieve this, you will set the Use Item Reference property to ensure user generated prompts in Report Studio are efficient, and you will set the Filter Item Reference property to ensure any generic IBM Cognos generated prompt is efficient. You will also configure PRODUCT_TYPE_EN to cascade off of PRODUCT_LINE_EN.

4. In the cell to the right of **Use Item Reference**, click the **ellipsis** (**…**), expand **Foundation Objects View>gosales> PRODUCT_LINE**, click **PRODUCT_LINE_CODE**, and then click **OK**.
5. In the cell to the right of **Filter Item Reference**, click the **ellipsis** (**…**), expand **Foundation Objects View>gosales>PRODUCT_LINE**, click **PRODUCT_LINE_CODE**, and then click **OK**.

 The results appear as follows:

Prompt Info	
Prompt Type	Server Determined
Cascade On Item Reference	
Display Item Reference	
Filter Item Reference	[gosales].[PRODUCT_LINE].[PRODUCT_LINE_CODE]
Use Item Reference	[gosales].[PRODUCT_LINE].[PRODUCT_LINE_CODE]

6. Save the project.

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Task 6. Test the prompt property change in Query Studio and Report Studio.

1. Publish the **GO Operational** package again, overwriting the earlier version.
2. Launch **IBM Cognos Connection**, log on, and then launch **Query Studio** selecting the **GO Operational** package.
3. Add the following items to the report:

Query Subject	Query Item
PRODUCT_LINE	**PRODUCT_LINE_EN**
ORDER_DETAILS	**QUANTITY**

4. Select the **PRODUCT_LINE_EN** column and then click **Filter** .
5. Select **Camping Equipment** and then click **OK**.

 The query retrieves the expected row.

PRODUCT_LINE_EN	QUANTITY
Camping Equipment	27,301,149
Summary	**27,301,149**

 To view the underlying SQL, you will convert the Query Studio report to a Report Studio report.

6. Under **Menu**, click **Manage File**, and then click **Open in Report Studio**.
7. In **Report Studio**, from the **Tools** menu, click **Show generated SQL/MDX**, and then, in the **Generated SQL/MDX** list, select **IBM Cognos SQL**.

 Note that the Where clause uses (PRODUCT_LINE.PRODUCT_LINE_CODE in ('991')). This shows that you are retrieving data based on indexed codes rather than the less-efficient and non-indexed PRODUCT_LINE_EN strings.

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8. Click **Close**, and then close **Report Studio** and **Query Studio** without saving the reports.

Results:
To meet reporting requirements, you verified that important query item properties such as Usage and Regular Aggregate were correct. Also, to make filtering more efficient, you configured PRODUCT_LINE _EN to use PRODUCT_LINE _CODE when filtering on PRODUCT_LINE _EN.

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Workshop 1: Verify and Modify Query Item Properties.

After every import of metadata, you need to verify that query item properties meet the needs of the business analysts creating reports for the Great Outdoors. You should:

- Verify query item properties. Change the Usage property from Fact to Attribute where numeric query items are neither facts nor indexes.
- In the PRODUCT query subject, ensure that PRODUCTION_COST and GROSS_MARGIN are averaged when their values are summarized.
- In the COUNTRY query subject, change COUNTRY_EN so that when a prompt is manually created or automatically generated it will cause retrieval through the COUNTRY_CODE key.
- Publish the package and verify your prompt works using Query Studio and Report Studio.

For more detailed information outlined as tasks, see the Task Table on the next page.

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Workshop 1: Task Table

Task	Where to Work	Hints
1. Change query item Usage properties.	Project Viewer and Property panes	• Ctrl+click all desired query items to make the same change to multiple items at once. • Change Usage to Attribute for numeric query items that are not facts for the following items: • **PRODUCT> BASE_PRODUCT_NUMBER** • **EMPLOYEE_HISTORY> EMPLOYEE_HISTORY_ PARENT**
2. Change Regular Aggregate properties.	Project Viewer and Property panes	• Ctrl+click all desired query items to make the same change to multiple items at once. • Set the Regular Aggregate property to Average for the following items: • **PRODUCT>PRODUCTION_ COST** • **PRODUCT>GROSS_MARGIN**
3. Change prompt properties.	Project Viewer and Property panes	• Change the Filter Item Reference and Use Item Reference properties for **COUNTRY>COUNTRY_EN** to use **COUNTRY>COUNTRY_CODE**

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4. Publish the package and verify your prompt works using Query and Report Studio.	Query Studio, Report Studio	• Publish GO Operational package. • In Query Studio, create a query using the following items: • **COUNTRY>COUNTRY_EN** • **ORDER_DETAILS> QUANTITY** • Filter COUNTRY_EN on Canada. • Open the report in Report Studio and use Tools>Show Generated SQL/MDX to see if retrieval is through COUNTRY_CODE. • In Framework Manager, save and close your project.

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Workshop 1: Results

Task 4.

After filtering the report in Query Studio, the results appear as follows:

COUNTRY_EN	QUANTITY
Canada	4,052,045
Summary	**4,052,045**

After viewing the SQL in Report Studio, the results appear as follows:

IBM Cognos SQL

```
select
    COUNTRY.COUNTRY_EN as COUNTRY_EN,
    XSUM(ORDER_DETAILS.QUANTITY for COUNTRY.COUNTRY_EN ) as
QUANTITY,
    XSUM(XSUM(ORDER_DETAILS.QUANTITY for COUNTRY.COUNTRY_EN ) at
COUNTRY.COUNTRY_EN ) as QUANTITY3
from
    GOSALES..GOSALES.COUNTRY COUNTRY,
    GOSALES..GOSALES.ORDER_DETAILS ORDER_DETAILS,
    GOSALES..GOSALES.BRANCH BRANCH,
    GOSALES..GOSALES.ORDER_HEADER ORDER_HEADER
where
    (COUNTRY.COUNTRY_CODE in (1004)) and
    (COUNTRY.COUNTRY_CODE = BRANCH.COUNTRY_CODE) and
    (BRANCH.BRANCH_CODE = ORDER_HEADER.SALES_BRANCH_CODE) and
    (ORDER_HEADER.ORDER_NUMBER = ORDER_DETAILS.ORDER_NUMBER)
group by
    COUNTRY.COUNTRY_EN
```

The SQL generated in Report Studio for the Query Studio query shows that you are accessing the data through COUNTRY_CODE.

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Business Analytics

Summary

- You should now be able to:
 - verify relationships and query item properties
 - ensure efficient filters by configuring prompt properties

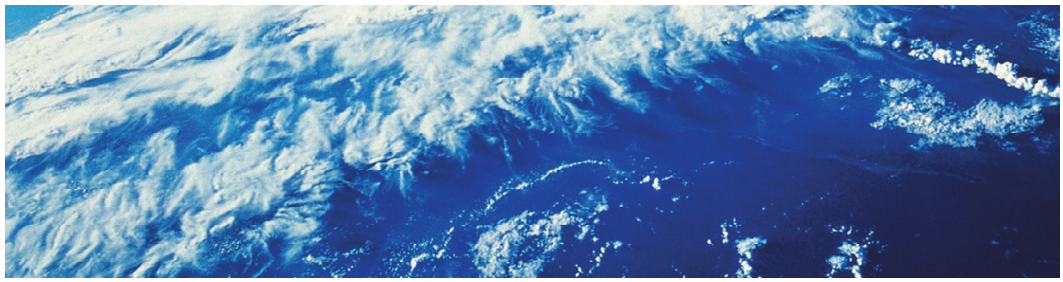
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Model for Predictable Results: Identify Reporting Issues

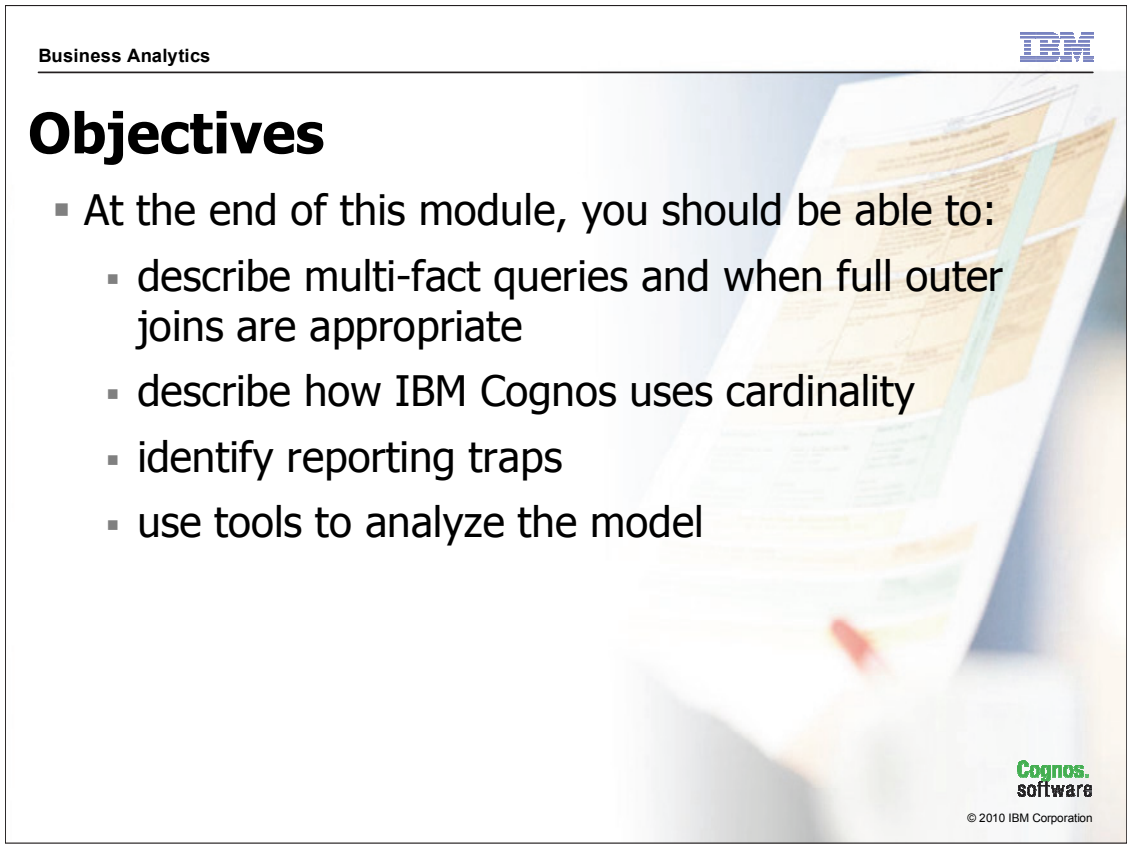
IBM Cognos BI



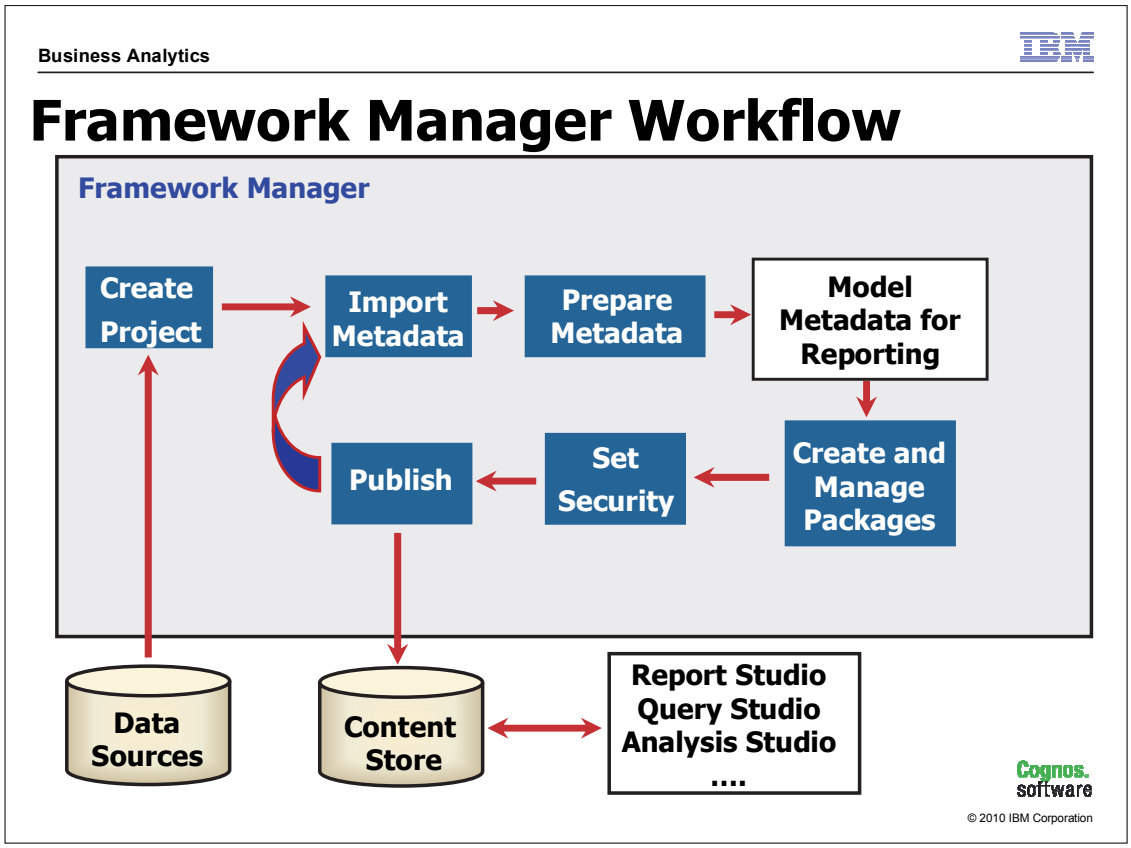
Business Analytics

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This module deals with identifying potential reporting issues before beginning to model the metadata.

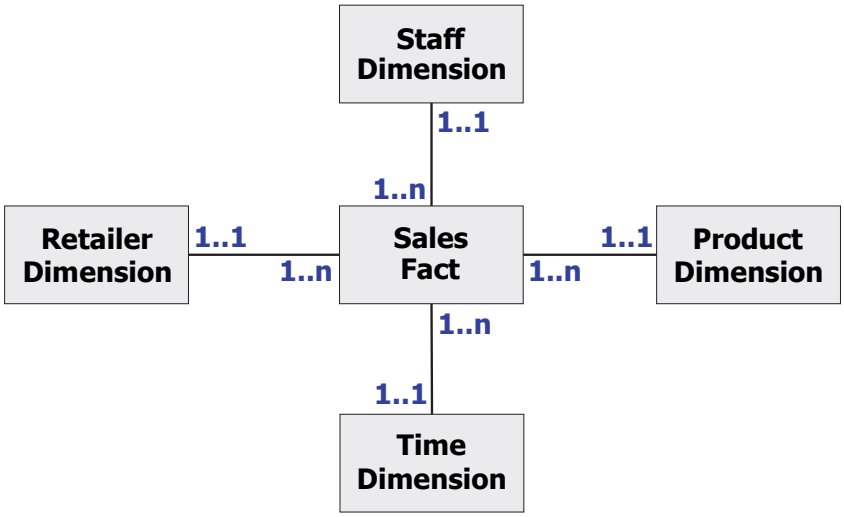
Solutions to the issues found in this module will be applied in later modules.

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Business Analytics

Define Single-Fact Queries

- A single-fact query consists of one or more measures from the same table



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The measures can be constricted by dimensional attributes taken from related dimension query subjects at the 1..1 end of 1..1 to 1..n relationships.

In most cases, single-fact queries are not a problem for reporting and usually generate simple and expected SQL.

If you change the cardinalities to be optional (0..1 and 0..n) you will see full outer joins in the generated SQL. These types of joins would be expected in the SQL since you requested them.

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Why Are Multi-Fact Queries Complicated?

- Examine the following data:

DAY_DATE	ORDER_METHOD	SALE_TOTAL
01/01/2005	E-mail	$10
01/02/2005	Telephone	$25
01/03/2005	Web	$40
01/04/2005	E-mail	$20

Sales Fact

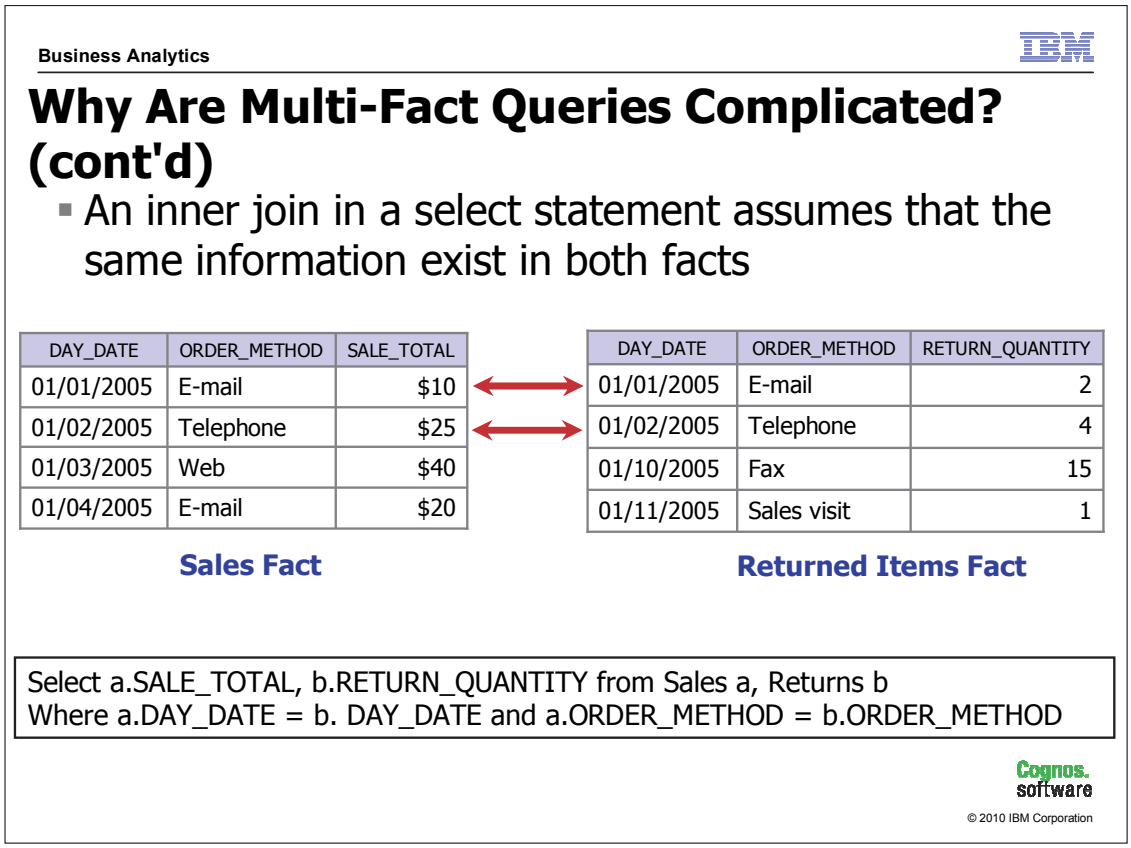
DAY_DATE	ORDER_METHOD	RETURN_QUANTITY
01/01/2005	E-mail	2
01/02/2005	Telephone	4
01/10/2005	Fax	15
01/11/2005	Sales visit	1

Returned Items Fact

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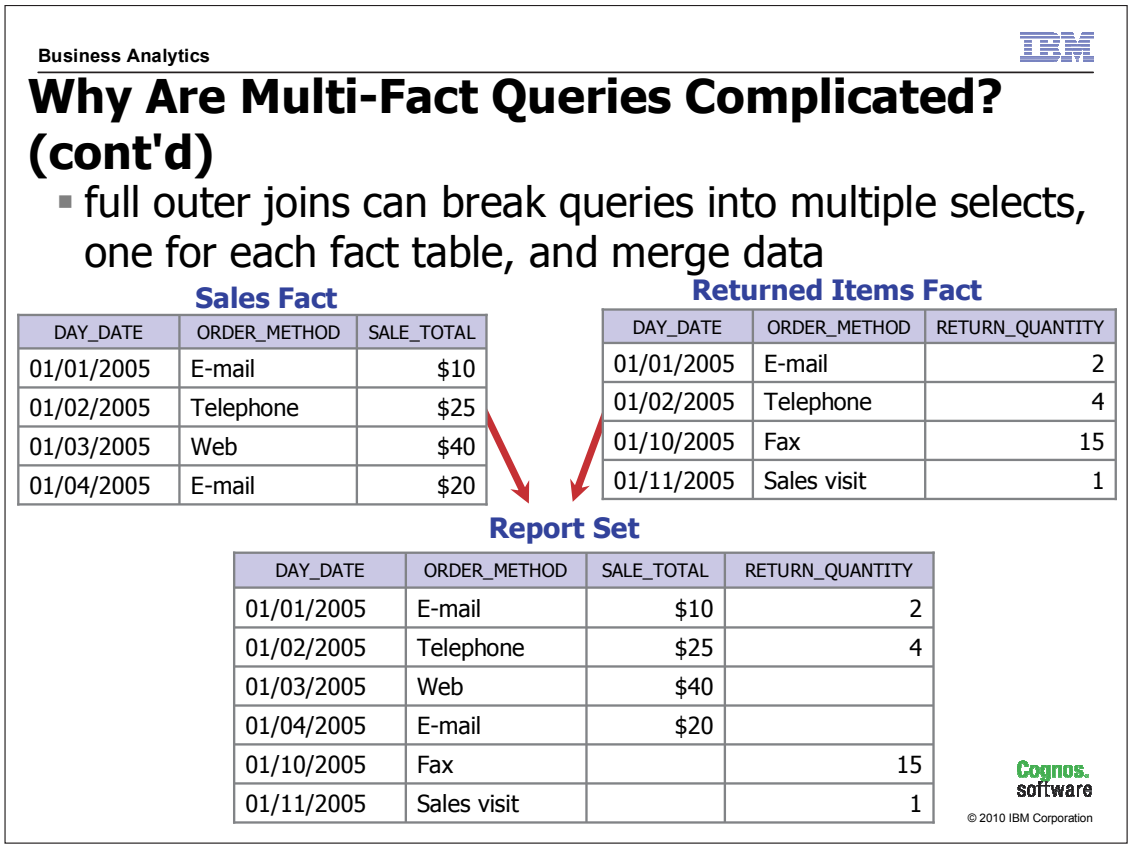
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An inner join would only return the first two records. If a filter ORDER_METHOD = 'Web' was added, 0 records would be returned.

Data is lost in this scenario.

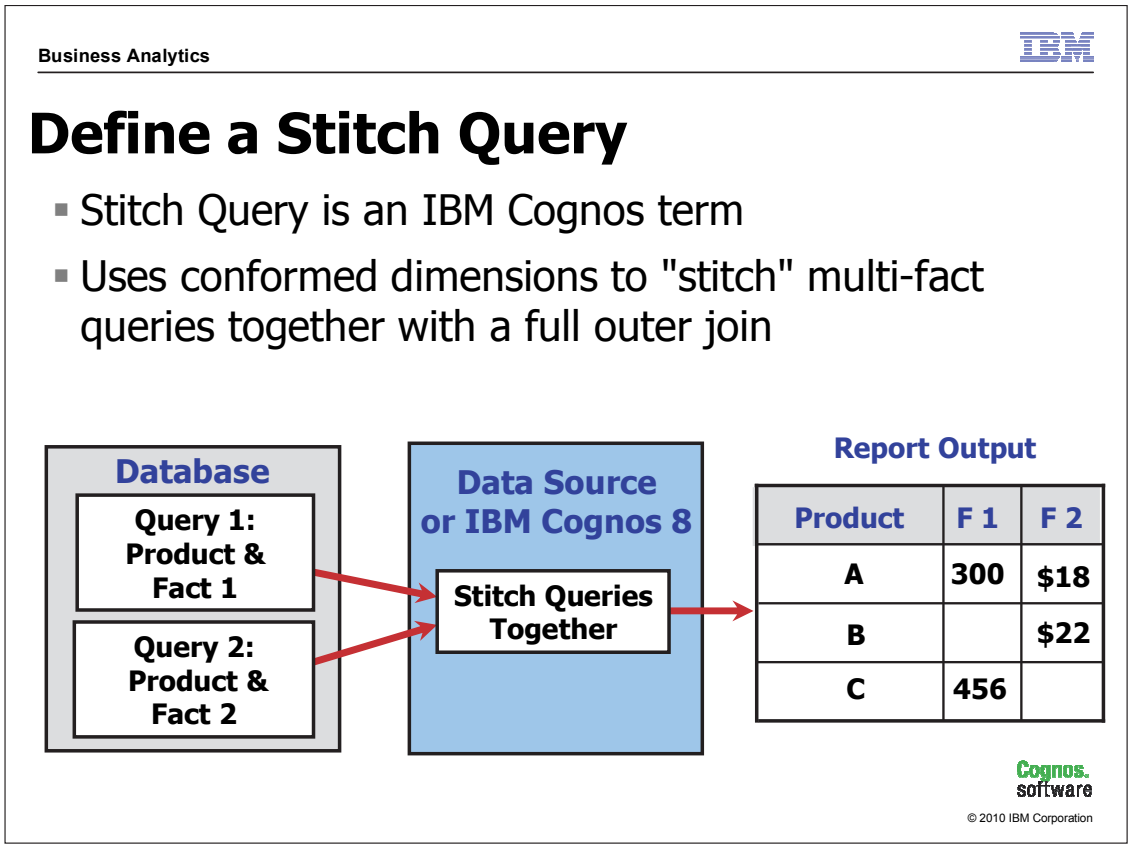
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No data is lost.

This is what IBM Cognos refers to as a stitch query.

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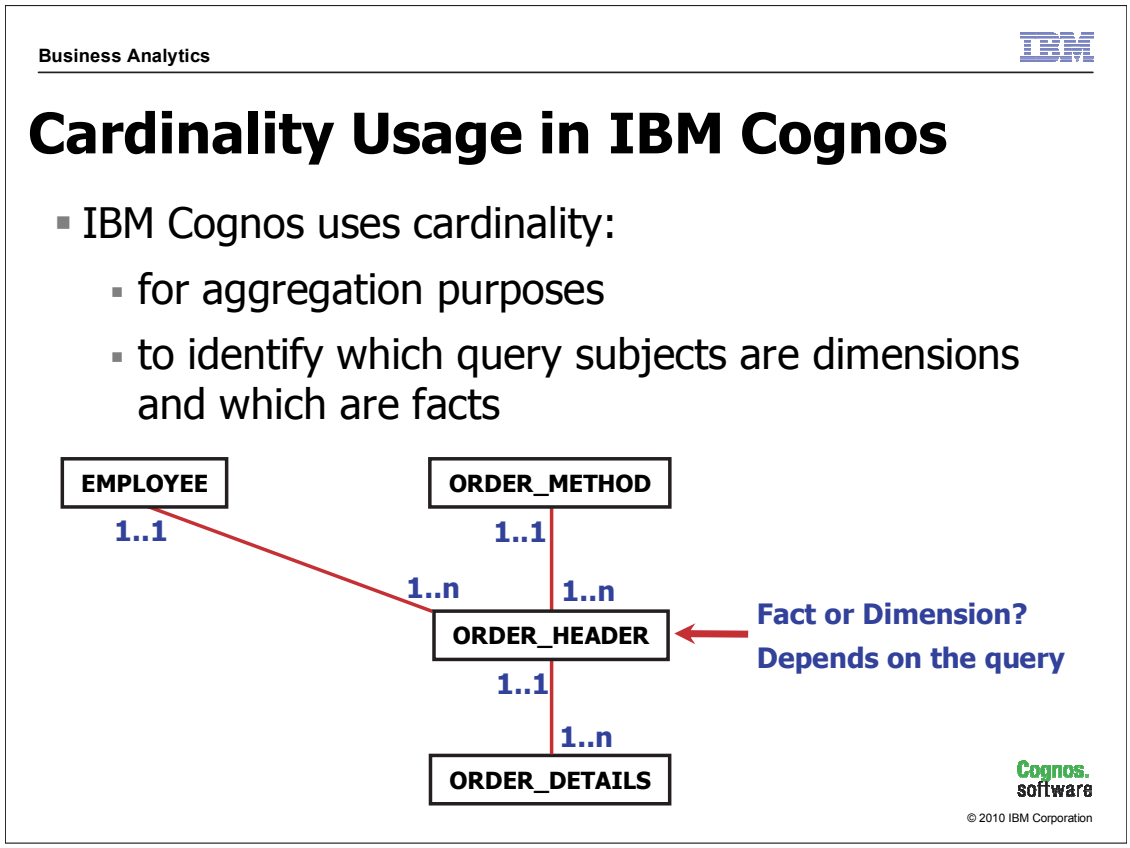
Conformed dimensions contain the descriptive attributes and corresponding names, meanings, and values that have been agreed to across the enterprise.

Conformed dimensions can be used to merge two independent fact queries together, as seen in the slide example above, without loss of data. In this case, the Product dimension is used to stitch the results of query 1 and query 2 together on the common value selected from the Product dimension. Again, as seen on the previous page, no values are lost on either side of the query. Where the facts have the same data in common, both fact cells contain values. Where a fact does not share common data, the fact cells are null.

If the data source supports this type of query, the processing will be done at the data source level. If not, the processing will be done on the IBM Cognos servers.

We will examine the anatomy of a stitch query later in the course.

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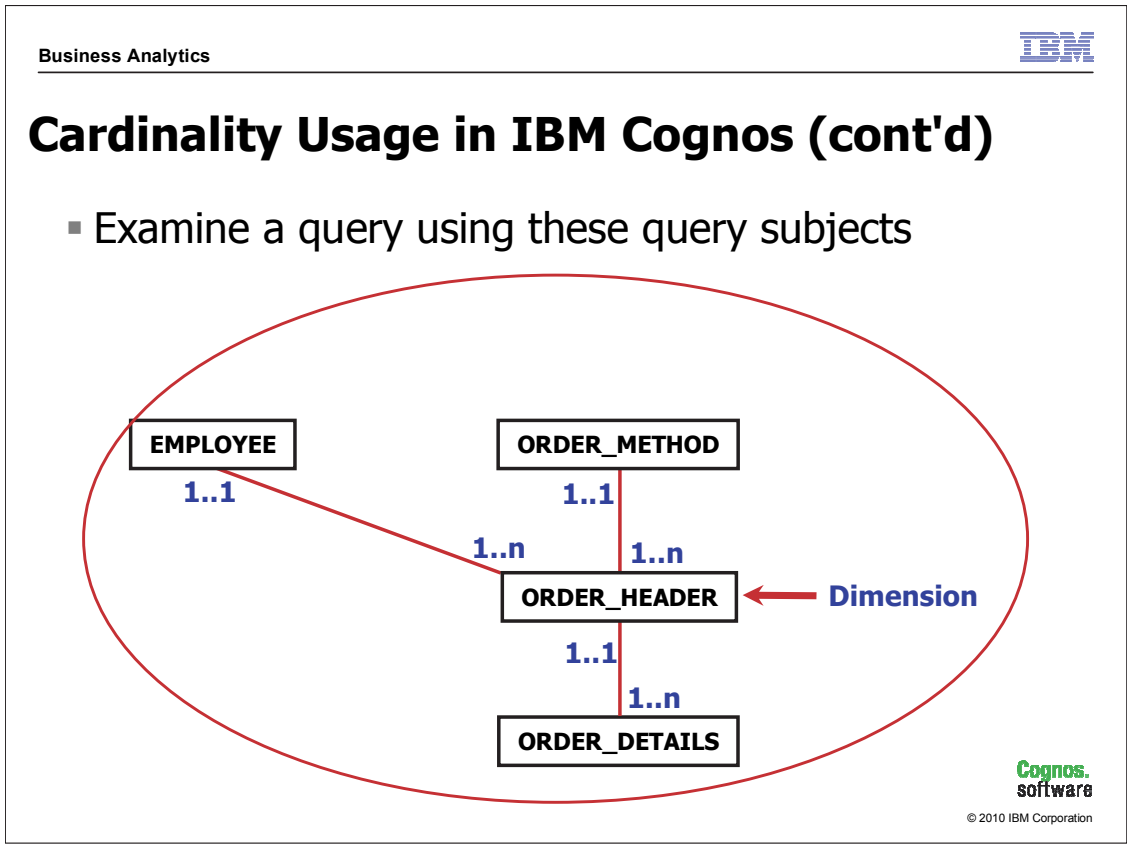


Typically, facts are found on the 1..n side of a query. The facts found in these tables can then be aggregated if requested by the user.

For every generated query, IBM Cognos identifies each query subject as either a "fact" or a "dimension" based on cardinality. Query subjects with only 0..n or 1..n cardinalities attached are identified as facts and query subjects with 0..1 or 1..1 cardinalities attached are identified as dimensions.

Query subjects with both types of cardinality attaché have the potential to be ambiguous. This is the case with ORDER_HEADER.

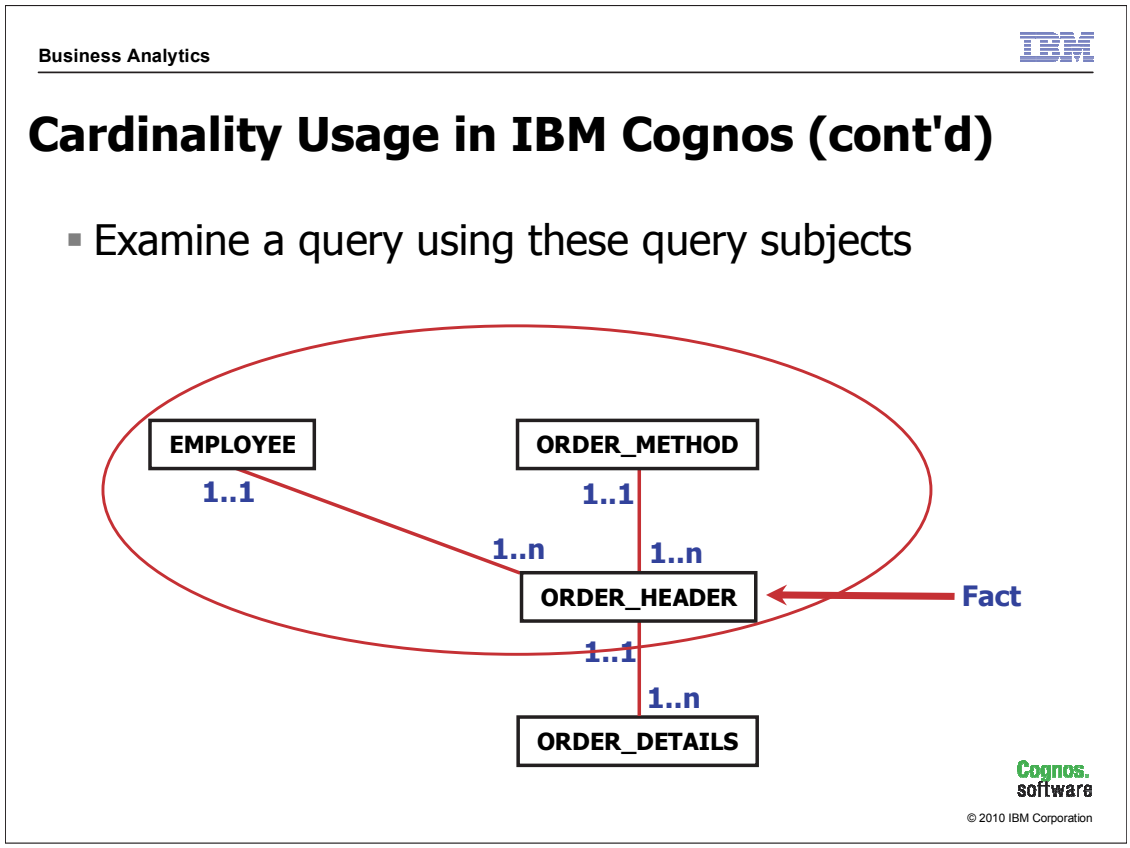
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Again, query usage is applied based on which query subjects are used in a query.

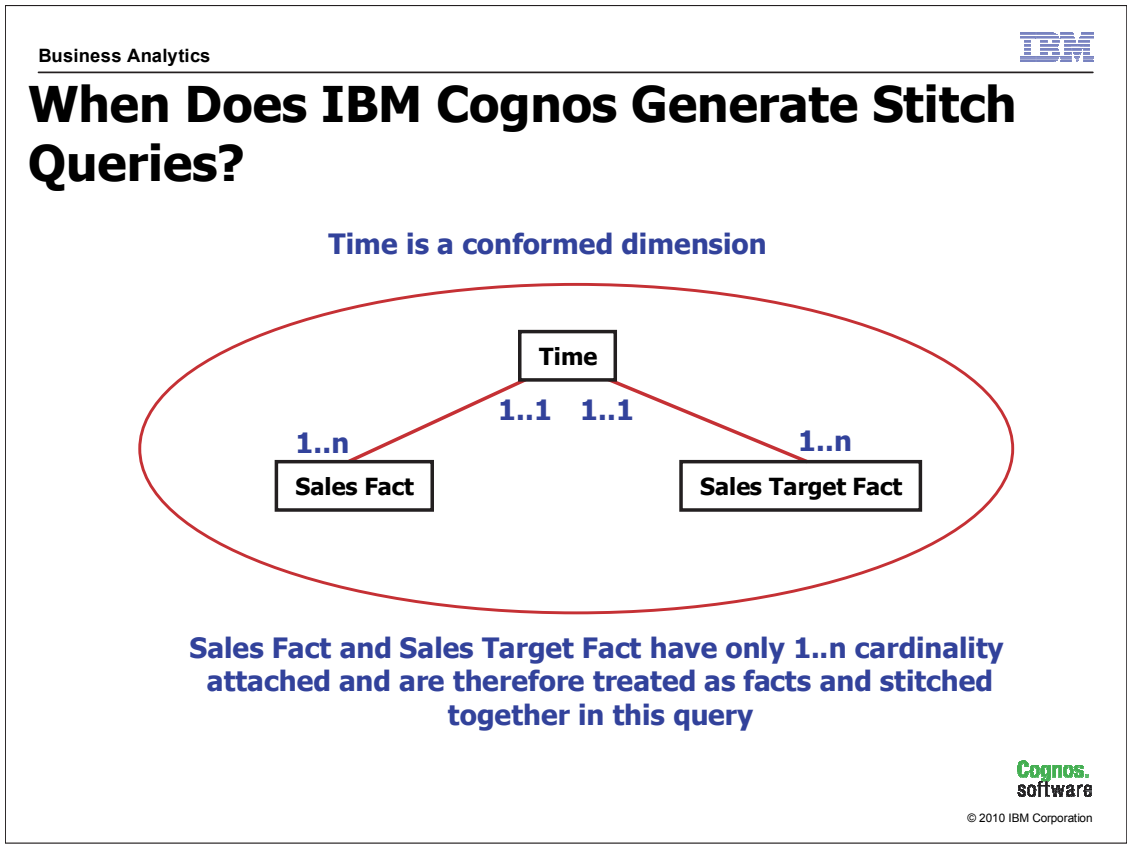
In the slide example, ORDER_HEADER has both 1..1 and 1..n cardinalities attached. Since fact query subjects must have only 1..n or 0..n cardinalities attached, ORDER_HEADER will be treated as a dimension in this scenario.

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In this query scenario, ORDER_HEADER has only 1..n cardinalities attached. Therefore it will be treated as a fact.

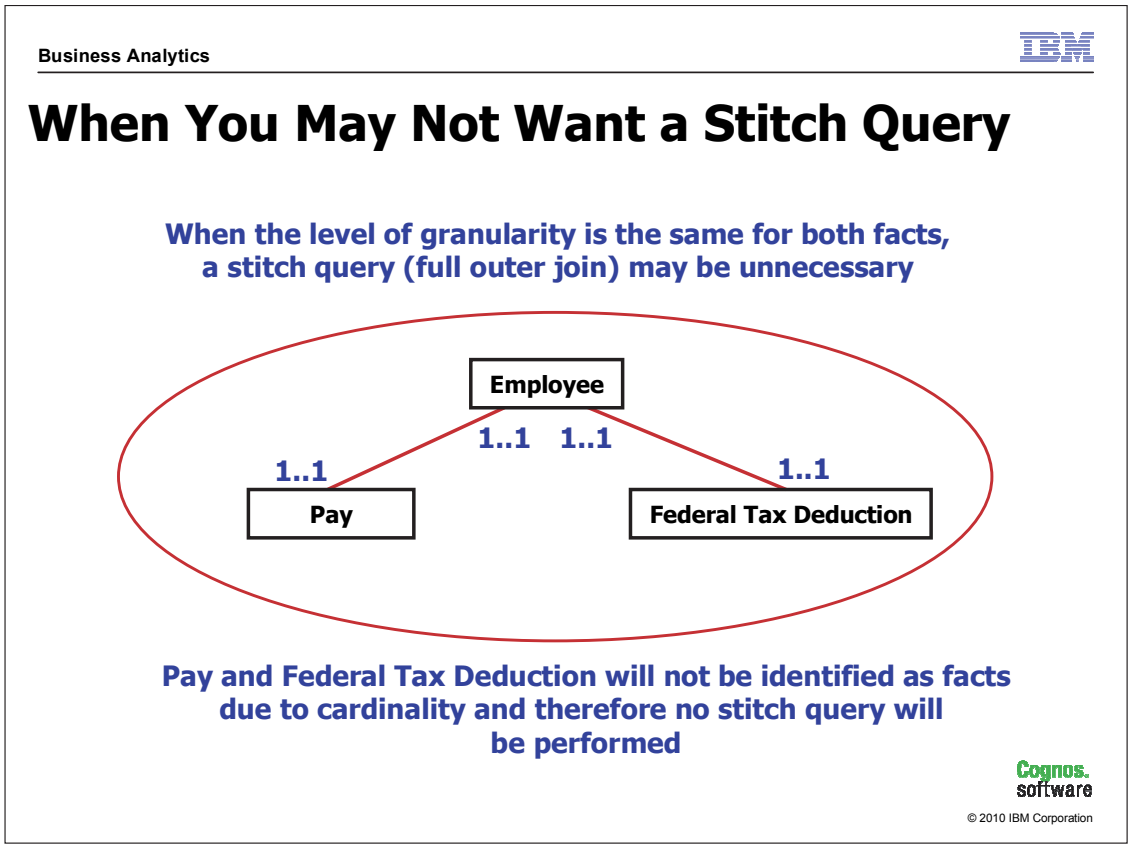
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When one or more conformed dimensions are used in a multi-fact query (where query subjects are identified as facts by the IBM Cognos query engine), a stitch query (full outer join) will occur.

A stitch query is required when you have different levels of granularity between the facts and do not want to lose uncommon rows of data.

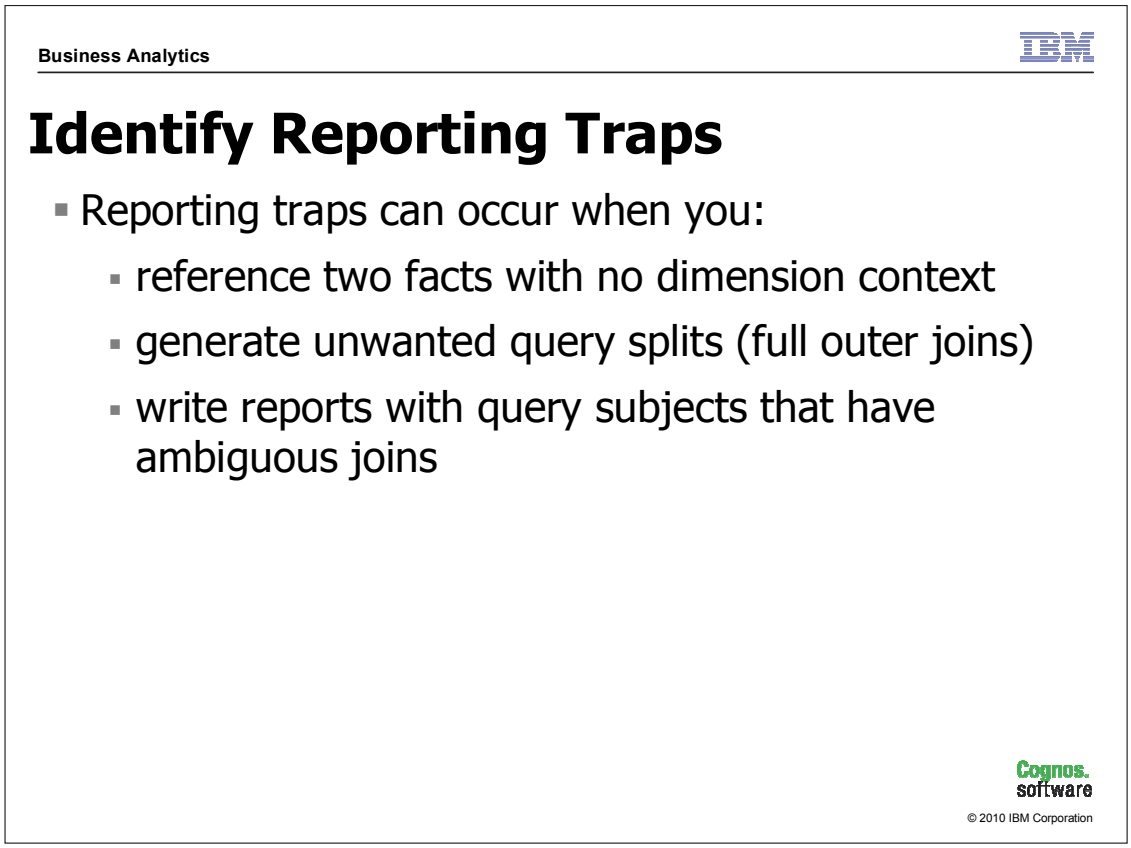
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In cases where the facts are at the same level of granularity, you may want to avoid the extra processing of a full outer join and simply configure 1..1 to 1..1 relationships between your dimension and fact query subjects.

You must be extremely familiar with your data and the expected results when implementing this type of configuration. Use this approach with caution as there is potential to prevent required stitch queries as the model scales and involves dimensions with different levels of granularity.

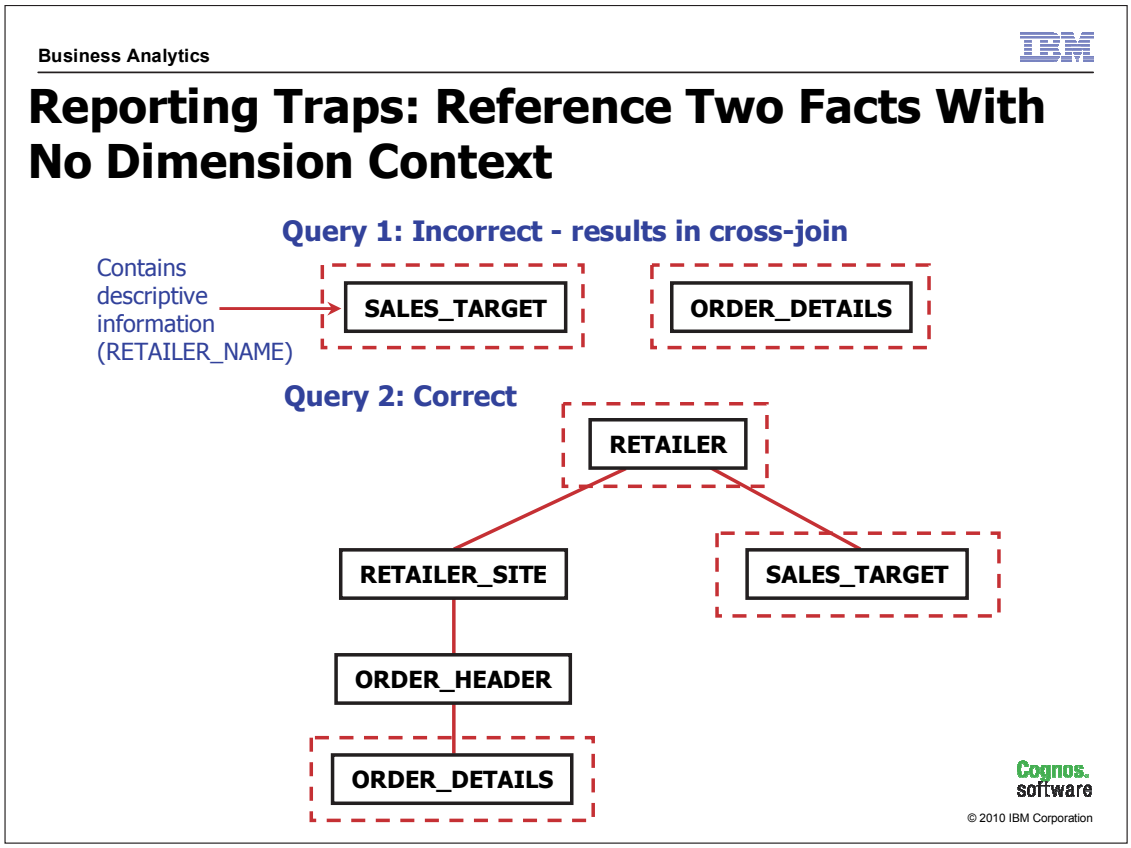
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When beginning to model for predictable results, you will want to initially identify any reporting traps that exist within your model.

We will cover these reporting traps throughout this module.

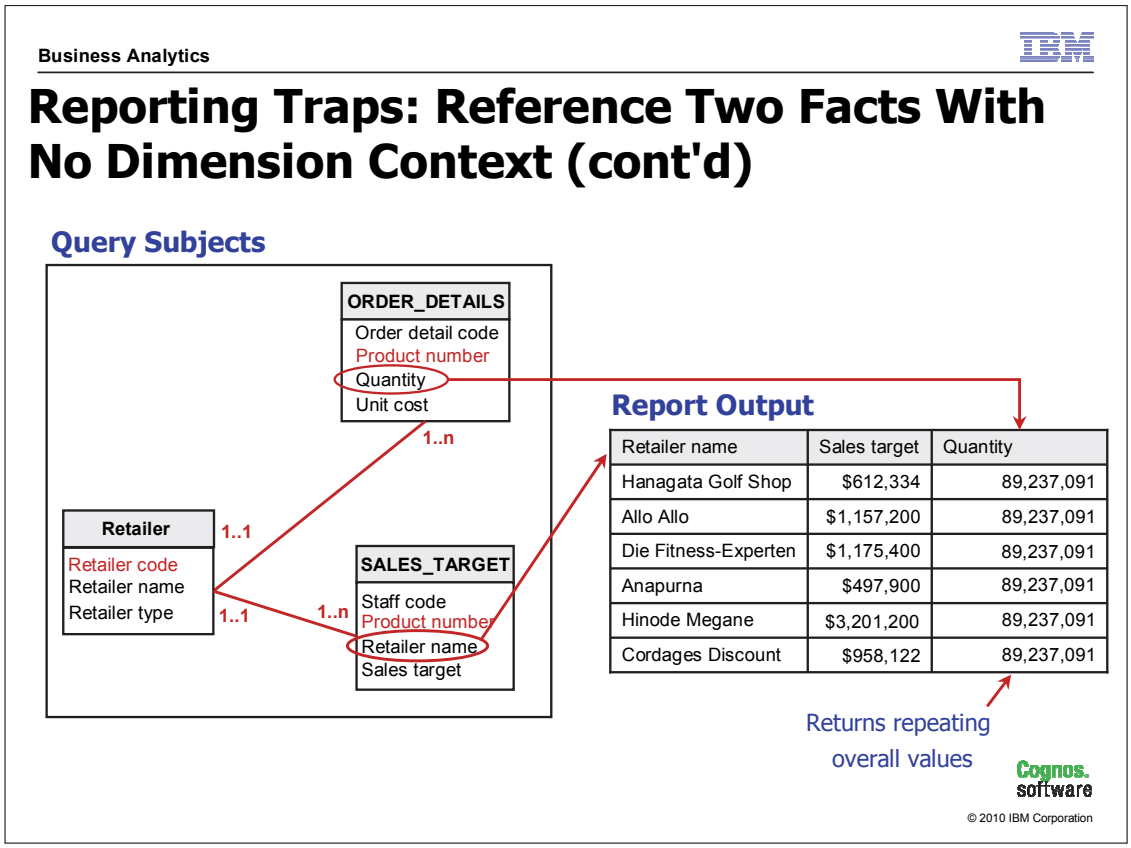
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A query on two facts with no dimension context is treated as a cross-product join. This brings duplicate data from the two datasets together in one query. Authors can accidentally author these types of queries if you have left textual (dimensional information) items in a fact query subject. For example, if Retailer name was a query item in SALES_TARGET, authors might choose this item thinking it also applies to ORDER_DETAILS.

This can be avoided if textual items are removed from the fact query subjects. Doing so will force authors to use at least one common dimension in the query to join the facts together. In Query 2, retailer information is taken from RETAILER.

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The query above returns the distinct overall total of Quantity and applies it to each Retailer name row.

Again, in this scenario, authors can accidentally misuse Retailer name from the SALES_TARGET fact query subject and cause unexpected results. Taking Retailer name from the conformed dimension would generate a stitch query and provide expected results.

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Demo 1: Reference Two Facts with No Dimension Context

Purpose:
A common requirement for the business analysts will be to generate a report that compares sales targets against actual sales. You will test such a report to identify possible reporting traps.

Components: **Framework Manager**, **Business Insight Advanced**

Project: **GO Operational**

Package: **GO Operational**

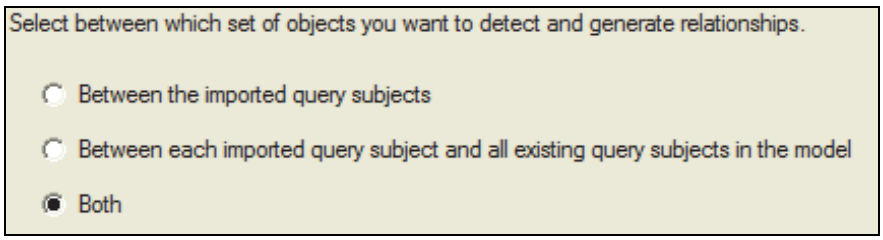
Task 1. Add SALES_TARGET table to the model.

1. In **Framework Manager**, close any projects that may be open, and then open the **GO Operational** project located at **C:\Edcognos\B5152\ CBIFM-Start Files\Module 6\GO Operational**.
2. Log in as User ID **admin**, Password **Education1!**, if prompted.
3. In the **Project Viewer**, expand **GO Operational Model** > **Foundation Objects View**, right-click the **gosales** namespace, and then click **Run Metadata Wizard**.

 You will import SALES_TARGET from the GOSALES database.
4. Ensure that **Data Sources** is selected, and then click **Next**.
5. Ensure that **GOSALES** is selected, and then click **Next**.
6. In the list of objects, expand **GOSALES** and **Tables**, and then select the **SALES_TARGET** table.
7. Click **Next**.

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8. On the **Generate Relationships** page, click the **Both** radio button as shown below.



 You want to generate relationships among the new query subjects as well as between the new and existing query subjects. This will prevent you from having to manually create the relationships after the import.

9. Click **Import**.

 The import process begins, and then a message appears summarizing the count of objects that were imported.

10. Click **Finish**.

Task 2. Try to create a Targets vs. Actual Revenue report.

1. Publish the **GO Operational** package
2. Launch **IBM Cognos Connection**, log in, and launch **Report Studio**, selecting the **GO Operational** package for a **List** report.

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3. Drag the following query items to the report:

Query Subject	Query Item
SALES_TARGET	**RETAILER_NAME** **SALES_TARGET**
ORDER_DETAILS	**QUANTITY** **UNIT_SALE_PRICE**

You could have taken COMPANY_NAME from RETAILER, but to identify potential areas of unpredictability for authors you will take it from SALES_TARGET.

4. Click the **Run** button and select **Run Report – HTML**.

The results appear as follows:

RETAILER_NAME	SALES_TARGET	QUANTITY	UNIT_SALE_PRICE
1 for 1 Sports shop	5,666,300	89,237,091	$120.12
4 Golf only	4,385,300	89,237,091	$120.12
4 Your Eyes	766,800	89,237,091	$120.12
Aarhus Sport	5,288,300	89,237,091	$120.12
Accapamento	5,338,900	89,237,091	$120.12

The resulting report has the same QUANTITY and UNIT_SALE_PRICE for every row, which is unexpected. To complete the report, you would create a calculation of quantity times unit sale price to get actual revenue values, but there is no need to continue since an issue has already been found.

5. Close your Internet browser.

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Task 3. Analyze the query in Framework Manager.

1. In **Framework Manager**, in the **Diagram**, locate **SALES_TARGET** and **ORDER_DETAILS**.

 There are no direct relationships between these two query subjects. To see how they are joined in a query, you will recreate the same query in Framework Manager and view the generated SQL.

2. In the **Project Viewer**, select and test the following query items with **Auto Sum** enabled:

Query Subject	Query Item
SALES_TARGET	**RETAILER_NAME** **SALES_TARGET**
ORDER_DETAILS	**QUANTITY** **UNIT_SALE_PRICE**

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3. Click the **Query Information** tab.

 The results appear as follows:

Cognos SQL

```
select
       D2.RETAILER_NAME  as  RETAILER_NAME,
       D2.SALES_TARGET  as  SALES_TARGET,
       D3.QUANTITY  as  QUANTITY,
       D3.UNIT_SALE_PRICE  as  UNIT_SALE_PRICE
 from
       (select
              SALES_TARGET.RETAILER_NAME  as  RETAILER_NAME,
              XSUM(SALES_TARGET.SALES_TARGET  for SALES_TARGET.RETAILER_N
        from
              GOSALES.GOSALES.gosales.SALES_TARGET SALES_TARGET
        group by
              SALES_TARGET.RETAILER_NAME
       ) D2,
       (select distinct
              XSUM(ORDER_DETAILS.QUANTITY )  as  QUANTITY,
              XAVG(ORDER_DETAILS.UNIT_SALE_PRICE )  as  UNIT_SALE_PRICE
        from
              GOSALES.GOSALES.gosales.ORDER_DETAILS ORDER_DETAILS
       ) D3
```

 The query has two subqueries (aliased as D2 and D3) in the **from** clause that are not joined. The two queries are simply separated by a comma with no join conditions. This is known as a cross-product join. In this case, one query is on all sales targets grouped by retailer name, and the other is on a distinct value for all order quantities and unit sale prices with no grouping. This explains why all the quantities and prices are the same. IBM Cognos does not join the two query structures because they are both facts and there is no conformed (shared) dimension joining them.

 You will need an alternate source for RETAILER_NAME, so you will try the only other instance of RETAILER_NAME in the project, the one in ORDER_HEADER.

4. Click **Close**.

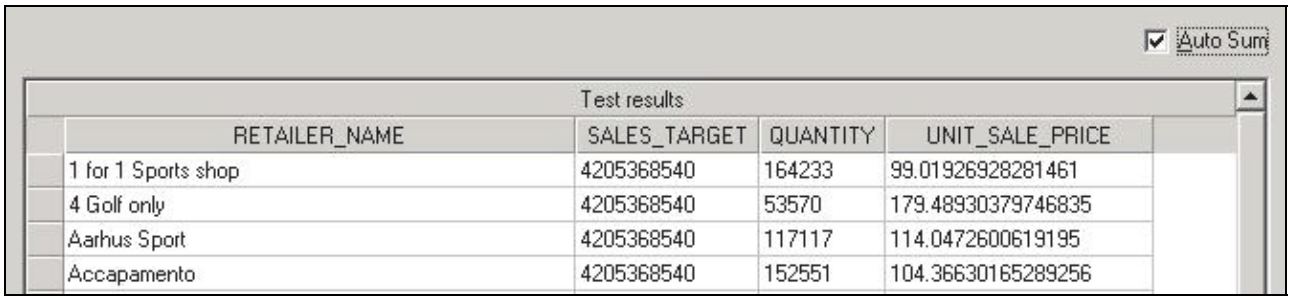
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Task 4. Attempt a resolution.

1. Select and test the following query items with **Auto Sum** enabled:

Query Subject	Query Item
ORDER_HEADER	**RETAILER_NAME**
SALES_TARGET	**SALES_TARGET**
ORDER_DETAILS	**QUANTITY** **UNIT_SALE_PRICE**

The results appear as follows:



You can now see separate quantities and unit sale prices for each retailer, but the sales targets are now all identical.

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2. Click the **Query Information** tab.

 The results appear as follows:

Cognos SQL

```
select
       D3.RETAILER_NAME  as  RETAILER_NAME,
       D2.SALES_TARGET  as  SALES_TARGET,
       D3.QUANTITY  as  QUANTITY,
       D3.UNIT_SALE_PRICE  as  UNIT_SALE_PRICE
 from
       (select distinct
              XSUM(SALES_TARGET.SALES_TARGET )  as  SALES_TARGET
        from
              GOSALES.GOSALES.gosales.SALES_TARGET SALES_TARGET
       ) D2,
       (select
              ORDER_HEADER.RETAILER_NAME  as  RETAILER_NAME,
              XSUM(ORDER_DETAILS.QUANTITY  for ORDER_HEADER.RETAILER_N
              XAVG(ORDER_DETAILS.UNIT_SALE_PRICE  for ORDER_HEADER.RET
        from
              GOSALES.GOSALES.gosales.ORDER_HEADER ORDER_HEADER,
              GOSALES.GOSALES.gosales.ORDER_DETAILS ORDER_DETAILS
        where
              (ORDER_HEADER.ORDER_NUMBER = ORDER_DETAILS.ORDER_NUMBER)
        group by
              ORDER_HEADER.RETAILER_NAME
       ) D3
```

 Once again you have two subqueries that are not joined. However, this time it is sales targets that are not grouped by retailer name. IBM Cognos still does not join the two query subjects because you have not provided a conformed dimension.

 If you speak with the database administrator, you will find out that COMPANY_NAME in the RETAILER query subject holds the retailer name that can be used between the two fact query subjects. You will try this in the next task.

3. Click **Close**.

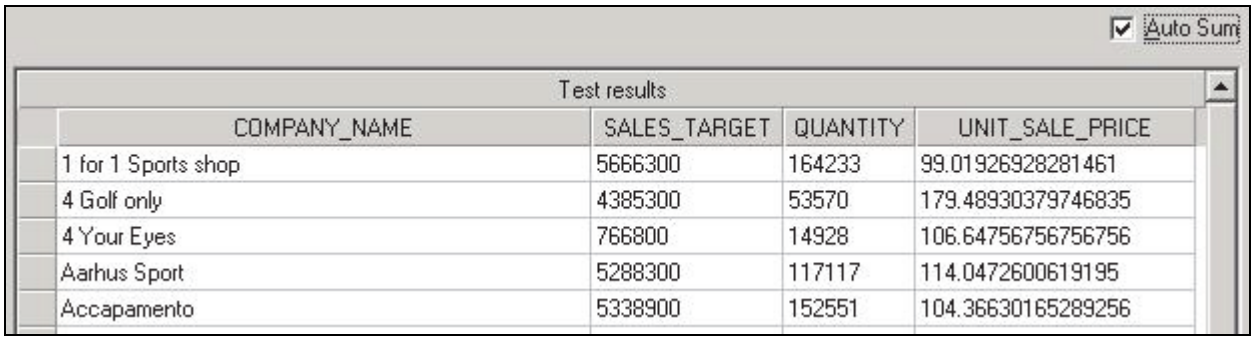
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Task 5. Correct the query.

1. Select and test the following query items with **Auto Sum** enabled:

Query Subject	Query Item
RETAILER	**COMPANY_NAME**
SALES_TARGET	**SALES_TARGET**
ORDER_DETAILS	**QUANTITY** **UNIT_SALE_PRICE**

The results appear as follows:



You can now see separate targets, quantities, and prices for each retailer. If you were to create this report in Query Studio, you would now calculate Actual Revenue to compare against the targets. (You will not do this now in order to continue investigating modeling issues and will create a Revenue calculation in the model later in the course.)

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2. Click the **Query Information** tab.

The results appear as follows:

Cognos SQL

```
select
       coalesce(D2.COMPANY_NAME,D3.COMPANY_NAME)  as  COMPANY_NAME,
       D2.SALES_TARGET  as  SALES_TARGET,
       D3.QUANTITY  as  QUANTITY,
       D3.UNIT_SALE_PRICE  as  UNIT_SALE_PRICE
 from
       (select
              RETAILER.COMPANY_NAME  as  COMPANY_NAME,
              XSUM(ORDER_DETAILS.QUANTITY  for RETAILER.COMPANY_NAME )  as
              XAVG(ORDER_DETAILS.UNIT_SALE_PRICE  for RETAILER.COMPANY_NAME
        from
              GOSALES.GOSALES.gosalesrt.RETAILER RETAILER,
              GOSALES.GOSALES.gosales.ORDER_DETAILS ORDER_DETAILS,
              GOSALES.GOSALES.gosalesrt.RETAILER_SITE RETAILER_SITE,
              GOSALES.GOSALES.gosales.ORDER_HEADER ORDER_HEADER
        where
              (RETAILER.RETAILER_CODE = RETAILER_SITE.RETAILER_CODE) and
              (RETAILER_SITE.RETAILER_SITE_CODE = ORDER_HEADER.RETAILER_SITE
              (ORDER_HEADER.ORDER_NUMBER = ORDER_DETAILS.ORDER_NUMBER)
        group by
              RETAILER.COMPANY_NAME
       ) D3
       full outer join
       (select
              RETAILER.COMPANY_NAME  as  COMPANY_NAME,
              XSUM(SALES_TARGET.SALES_TARGET  for RETAILER.COMPANY_NAME )  a
        from
              GOSALES.GOSALES.gosalesrt.RETAILER RETAILER,
              GOSALES.GOSALES.gosales.SALES_TARGET SALES_TARGET
        where
              (RETAILER.RETAILER_CODE = SALES_TARGET.RETAILER_CODE)
        group by
              RETAILER.COMPANY_NAME
       ) D2
       on (D3.COMPANY_NAME = D2.COMPANY_NAME)
```

There are two subqueries joined by COMPANY_NAME (retailer name) through a full outer join. Again, in this case, a full outer join is expected since you are stitching two separate fact queries together.

The query scenarios you just went through support the concept of ensuring descriptive data is retrieved from dimensions and not facts.

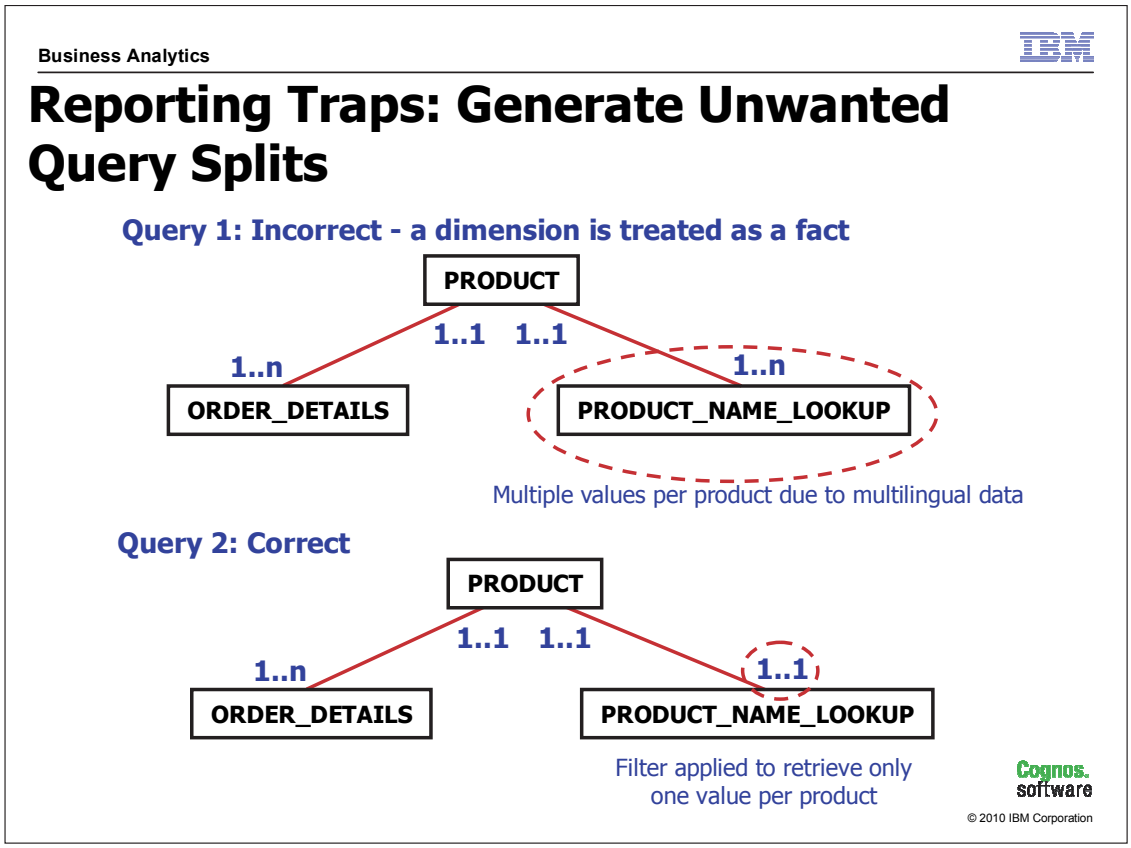
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3. Click **Close**, and leave Framework Manager open for the next demo.

Results:
A common requirement for the business analysts will be to compare sales targets against actual sales. You tested such a query, identified a reporting trap, and identified a proper query to return expected results.

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Unwanted query splits (full outer joins) occur when query subjects (such as PRODUCT_NAME_LOOKUP in Query 1) are incorrectly identified as facts.

In this case PRODUCT_NAME_LOOKUP contains several values for each product in the PRODUCT table, one for each supported language in this multilingual table. The intent is for PRODUCT_NAME_LOOKUP to behave as a lookup table and return one value per product. Instead it acts as a fact based on cardinality.

In Query 2, the cardinality for PRODUCT_NAME_LOOKUP has been changed to 1..1 after a filter is put in place to ensure only one value is returned. In this scenario, it will always act as a dimension

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Demo 2: Generate Unwanted Query Splits

Purpose:
Authors will want to report on the overall quantity of products sold. You will test such a query to identify a possible reporting trap.

Component: **Framework Manager**

Project: **GO Operational**

Task 1. Create a query to view total quantity sold by product.

1. In **Framework Manager**, select and test the following query items with **Auto Sum** enabled:

Query Subject	Query Item
PRODUCT_NAME_LOOKUP	**PRODUCT_NAME**
PRODUCT	**PRODUCT_NUMBER**
ORDER_DETAILS	**QUANTITY**

 In order to return a larger result set, you will alter the options.

2. Click **Options** in the lower right corner, under **Number of results**, change the value from **25** to **250**, and then click **OK**.

 Other options will be covered later in the course.

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3. Click **Test Sample**.

The results appear as follows:

Test results		
PRODUCT_NAME	PRODUCT_NUMBER	QUANTITY
Beg Air TrailChef	1110	4308828
Bukłak na wodę BiwaKuchnia	1110	4308828
Cantimplora flexible Cocinero Viajero	1110	4308828
Citerne souple ChefDeCamp	1110	4308828
Contenitore per liquidi Chef	1110	4308828
Friluftskockens vätskebehållare	1110	4308828
Kantung Air TrailChef	1110	4308828
Mochila-cantil Serrania	1110	4308828
Nomád szakács flakon	1110	4308828
Pionierwaterzak	1110	4308828

Notice the different language name but the same quantity value for the same product number.

PRODUCT_NAME_LOOKUP is a table in the database that contains multiple rows for each product, one for each supported language. Because there are multiple rows, the relationship is currently correct. 1..1 from PRODUCT to 1..n to PRODUCT_NAME_LOOKUP. It is not that this query is incorrect, but it may not be what the author expected. Likely you would want to see one product, in one language, with one summarized QUANTITY value.

You will look at the SQL to see what occurred.

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4. Click the **Query Information** tab.

 The results appear as follows:

Cognos SQL

```
select
       D2.PRODUCT_NAME  as  PRODUCT_NAME,
       coalesce(D2.PRODUCT_NUMBER,D3.PRODUCT_NUMBER)  as  PRODUCT_NUMBER,
       D3.QUANTITY  as  QUANTITY
 from
       (select distinct
              PRODUCT_NAME_LOOKUP.PRODUCT_NAME  as  PRODUCT_NAME,
              PRODUCT_NAME_LOOKUP.PRODUCT_NUMBER  as  PRODUCT_NUMBER
        from
              GOSALES.GOSALES.gosales.PRODUCT_NAME_LOOKUP PRODUCT_NAME_LOOKUP
       ) D2
        full outer join
       (select
              ORDER_DETAILS.PRODUCT_NUMBER  as  PRODUCT_NUMBER,
              XSUM(ORDER_DETAILS.QUANTITY  for ORDER_DETAILS.PRODUCT_NUMBER )
        from
              GOSALES.GOSALES.gosales.ORDER_DETAILS ORDER_DETAILS
        group by
              ORDER_DETAILS.PRODUCT_NUMBER
       ) D3
        on (D2.PRODUCT_NUMBER = D3.PRODUCT_NUMBER)
```

 Notice the two subqueries that are being joined with a full outer join. One retrieves all the multilingual product names for each product number, and the other, summarized order quantities for each product number. The two queries are then stitched together. This is an unwanted query split, since the intent in this query is to return one product name per product and show the quantities sold for that product.

5. Click **Close**.

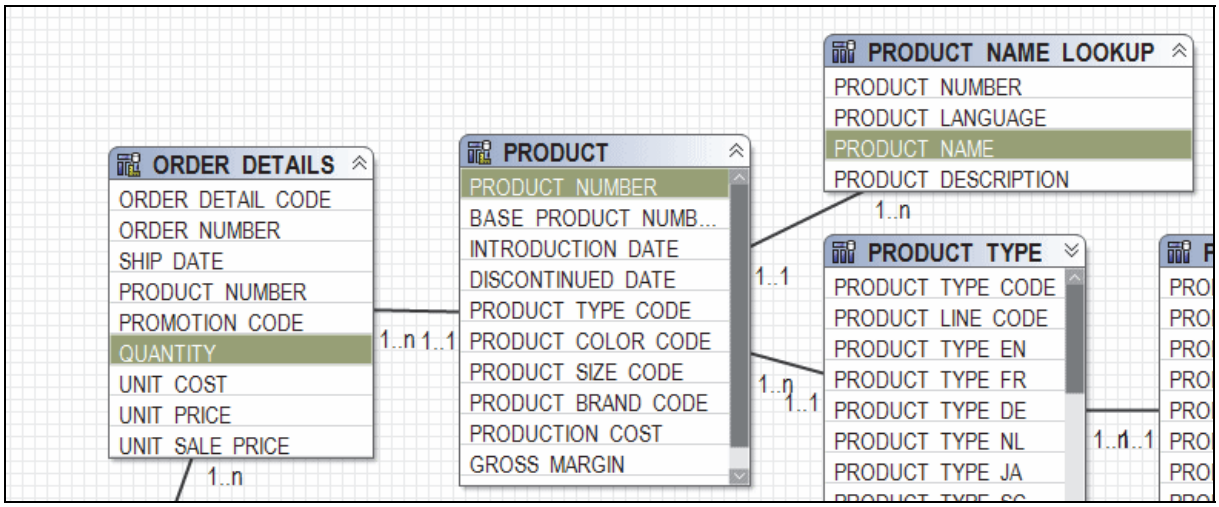
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Task 2. Examine the objects and their cardinality.

1. Click **Diagram** on the right side of the screen.

 In the diagram, locate **PRODUCT_NAME_LOOKUP**, **PRODUCT**, and **ORDER_DETAILS**.

 The results appear similar to as follows:

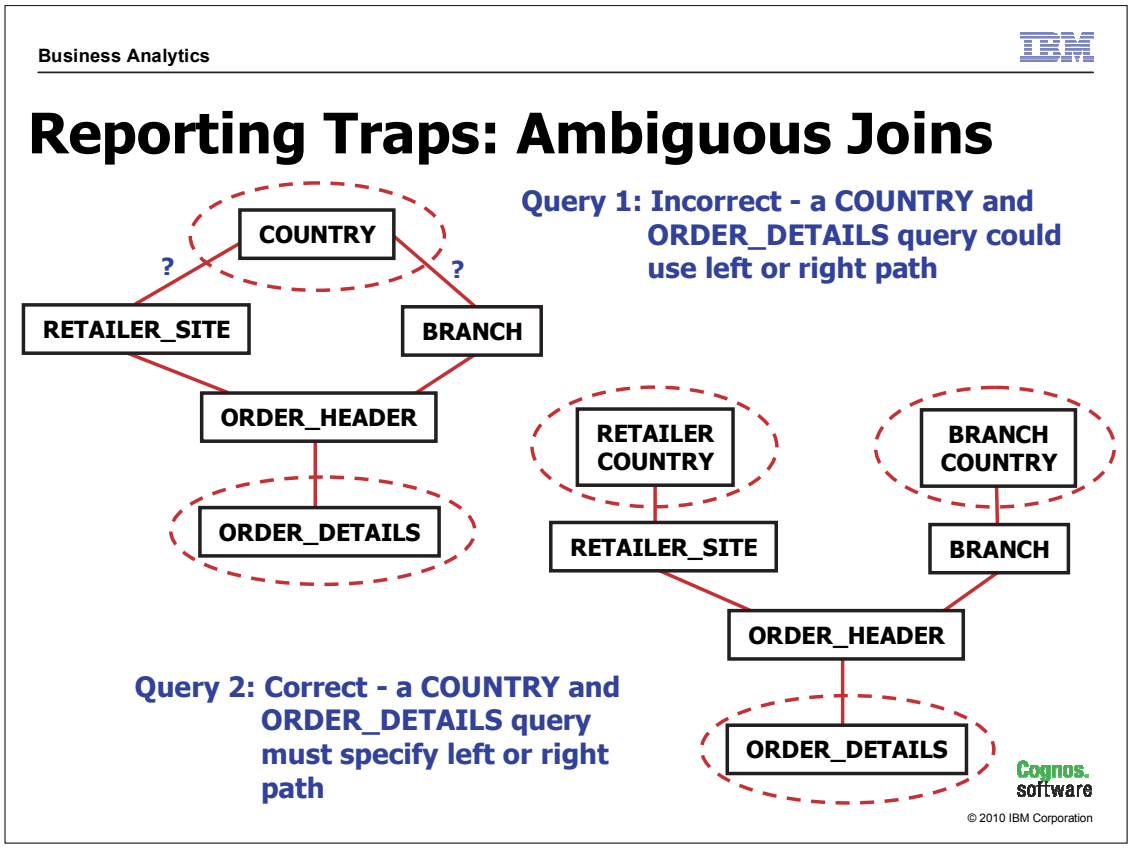


 In this scenario, PRODUCT is treated as a dimension (only 1..1 cardinalities attached), and ORDER_DETAILS and PRODUCT_NAME_LOOKUP are treated as facts (only 1..n cardinalities attached).

 You will resolve the PRODUCT_NAME_LOOKUP issue later in the course by applying a filter and changing the cardinality.

Results:
You tested a query on total quantity sold by product to identify a possible reporting trap and found an unwanted query split.

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Remove the risk of taking the wrong query path by removing the ambiguity: Creating aliases of COUNTRY with the appropriate relationships allows report authors to choose the desired path, in this case order details by retailer country or branch country.

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Demo 3: Identify Ambiguous Joins

Component: **Framework Manager**

Project: **GO Operational**

Purpose:
Another common requirement for the business analysts will be to report on sales figures by retailer country. You will test such a query to identify a possible reporting trap.

Task 1. Create the report.

1. In **Framework Manager**, select and test the following query items with **Auto Sum** enabled:

Query Subject	Query Item
COUNTRY	**COUNTRY_EN**
ORDER_DETAILS	**QUANTITY**

The results appear as follows:

COUNTRY_EN	QUANTITY
Australia	1599920
Austria	1660769
Belgium	1302716
Brazil	1741344
Canada	4052045
China	4413127
Finland	2784969
France	3948439

The goal is to create a query for the number of units sold in each retailer's country. These results seem like they might be correct. But to be sure, you will look at the SQL generated for this query.

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2. View the SQL on the **Query Information** tab.

 The results appear as follows:

Cognos SQL

```
select
       COUNTRY.COUNTRY_EN  as  COUNTRY_EN,
       XSUM(ORDER_DETAILS.QUANTITY  for COUNTRY.COUNTRY_EN )  as  Q
 from
       GOSALES.GOSALES.gosales.COUNTRY COUNTRY,
       GOSALES.GOSALES.gosales.ORDER_DETAILS ORDER_DETAILS,
       GOSALES.GOSALES.gosales.ORDER_HEADER ORDER_HEADER,
       GOSALES.GOSALES.gosales.BRANCH BRANCH
 where
       (COUNTRY.COUNTRY_CODE = BRANCH.COUNTRY_CODE) and
       (BRANCH.BRANCH_CODE = ORDER_HEADER.SALES_BRANCH_CODE) and
       (ORDER_HEADER.ORDER_NUMBER = ORDER_DETAILS.ORDER_NUMBER)
 group by
       COUNTRY.COUNTRY_EN
```

 The query did not take the path you wanted (through RETAILER_SITE). Instead, it took the path through BRANCH to ORDER_HEADER to ORDER_DETAILS. So the query set returned the number of units sold in each sales branch country.

3. Click **Close**.

Task 2. Examine the objects and their relationships.

You will use a feature called Context Explorer that helps you isolate modeling objects for closer examination and testing. It is a focused subset of the overall diagram. You will first change the default behavior of the Context Explorer to only show objects you select and not all related objects of the items you select.

1. From the **Diagram** menu, click **Diagram settings**.
2. Click the **Context Explorer** tab, select **Show only the selected objects**, and then click **OK**.

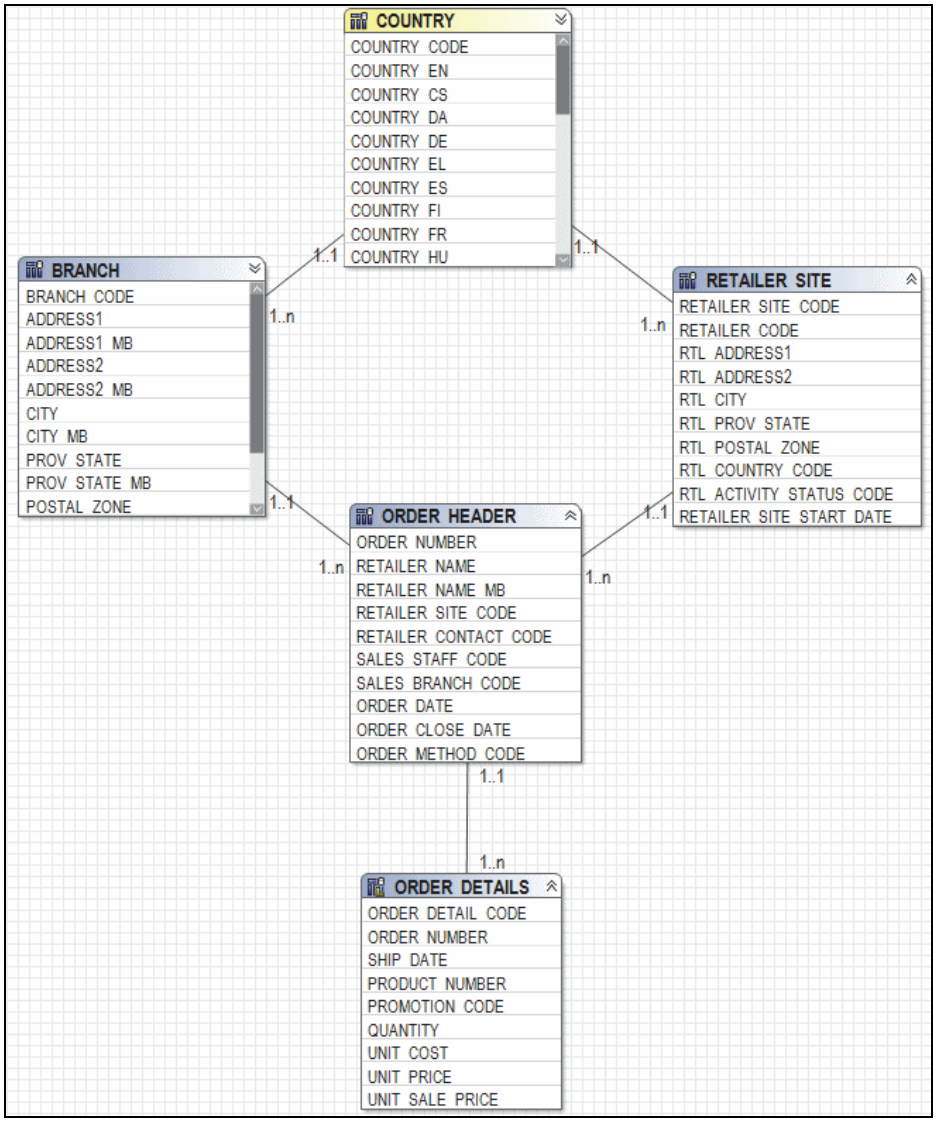
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3. In the **Project Viewer**, select the following query subjects:
 - **COUNTRY**
 - **BRANCH**
 - **RETAILER_SITE**
 - **ORDER_HEADER**
 - **ORDER_DETAILS**
4. Right-click one of the selected objects, and then click **Launch Context Explorer**.

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5. Arrange the diagram as shown below:



When a query can take more than one path of equal length and all query subjects are in a single namespace or folder, IBM Cognos chooses the relationship that comes first alphabetically. Using modeling techniques such as alias query subjects, you can avoid all ambiguity.

You will apply a solution in the next module.

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6. Close the **Context Explorer**, and leave Framework Manager open for the next demo.

Results:
You tested a query on sales by country, intending the countries to be for retailers. Because there were multiple query paths that could be used, you discovered the potential for unpredictable results.

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Business Analytics

Use Tools to Analyze the Model

Recommendation #4



- Verify Model: identifies errors
- Model Advisor: identifies areas needing review
- Model in freehand to identify:
 - which query subjects can act as either a fact or a dimension
 - fact query subjects that include descriptive data
 - unclear query paths
 - groupings of data (which items will be used to create a fact or dimension query subject for presentation to end users?)

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Verify Model: After you select the conditions and severity for which you want to test, Verify Model identifies the errors and offers automated or manual repairs.

Model Advisor: After you select the conditions for which you want to test, Model Advisor gives a clear, graphical presentation that summarizes the design issues uncovered and offers links to documentation for evaluating and resolving the issues.

Modeling in freehand: Use a diagram printout to identify areas for concern and how you will build your final model. Concentrate on modeling dimensions first, since they are usually easy to identify, more problematic, and can resolve most of the modeling design issues.

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Demo 4: Use Tools to Analyze the Model

Purpose:
Prior to modeling the metadata, you will analyze the model for errors and design issues.

Component: **Framework Manager**

Project: **GO Operational**

Task 1. Analyze for errors.

1. In the **Project Viewer**, right-click the **gosales** namespace, and then click **Verify Selected Objects**.

 The Options tab lets you control two aspects of the verification process: the severity and the categories of verification. You will accept the defaults.

2. Click **Verify Model**.

 No issues have been detected in this simple model. Note the Repair Selected tool, and the ability to group reported issues by object id, severity, or message description.

3. Click **Close**.

 You can perform this verification process on any level under the root namespace of the project or verify the entire model from the Project menu.

 Verification is also performed by default when publishing a package. All contents of the package are verified unless you deselect the option in the publish wizard.

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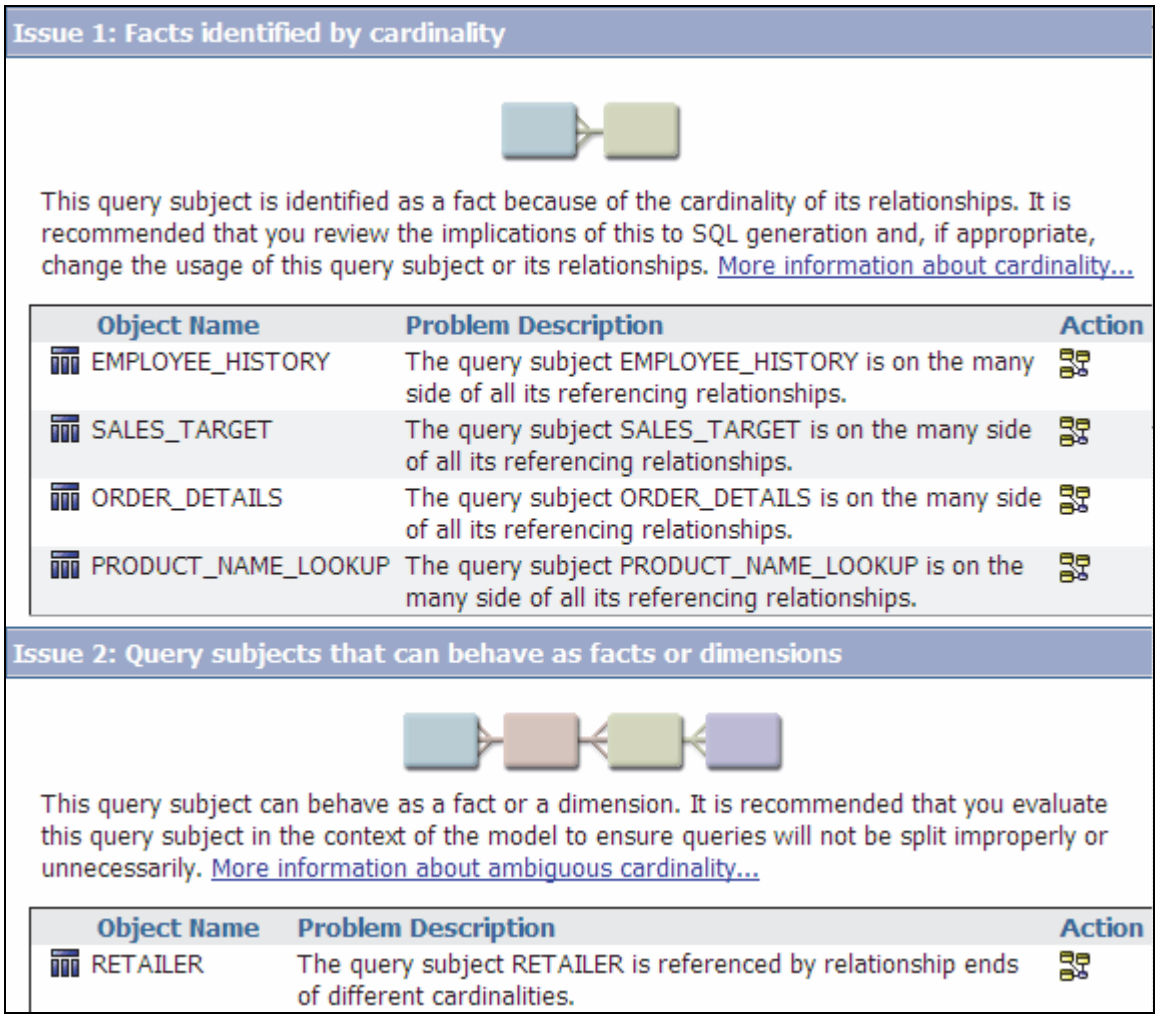
Task 2. Analyze for design issues.

1. In **Project Viewer**, right-click **gosales** and then click **Run Model Advisor**.

 The Options tab lets you control three forms of analysis: relationships, determinants, and miscellaneous checks. You will accept the defaults.

2. Click **Analyze**.

 The results appear similar to as follows:



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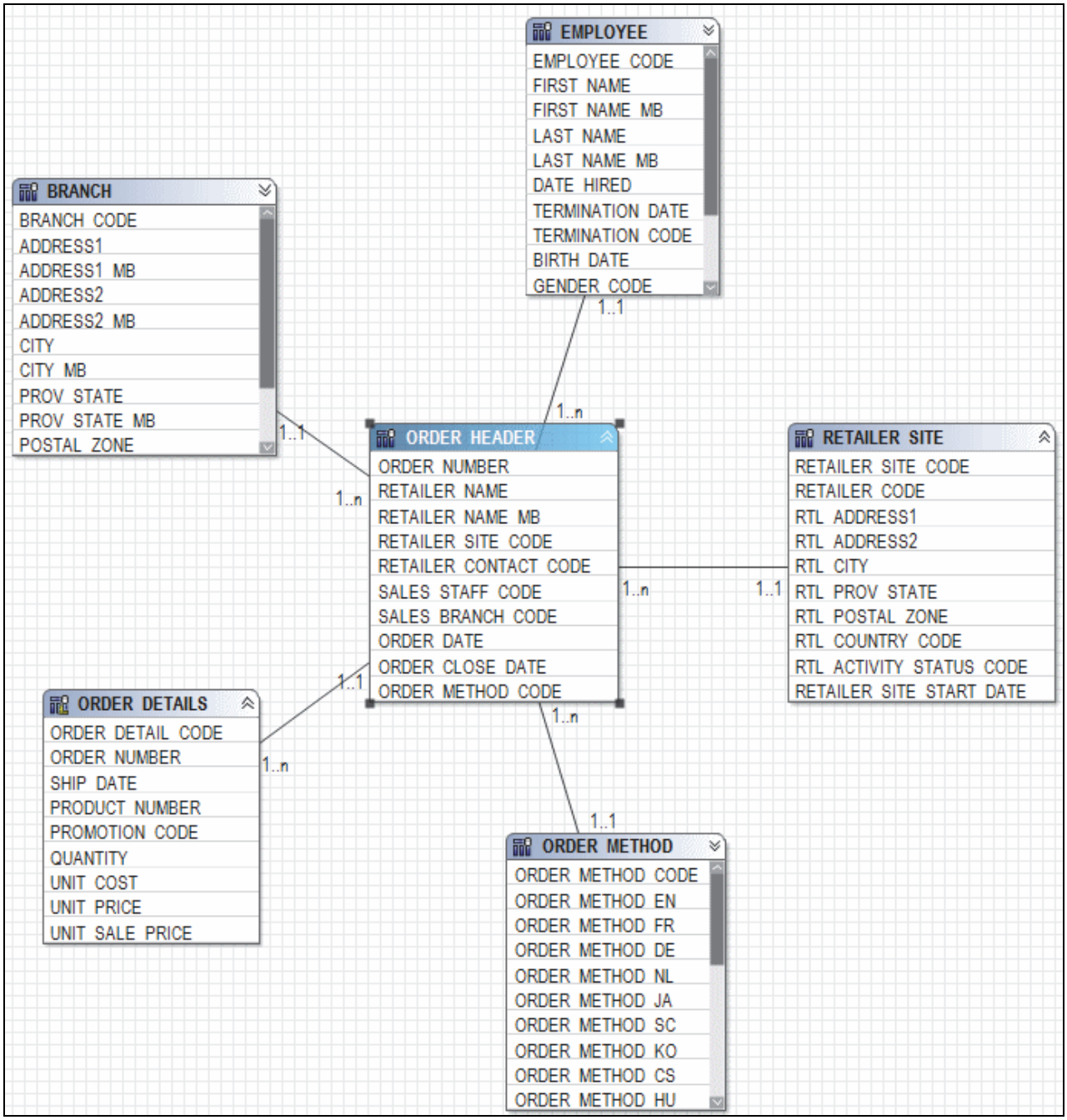
Issue 1 is "Facts identified by cardinality." You should confirm that the query subjects identified here are indeed facts. Both ORDER_DETAILS and SALES_TARGET are. But PRODUCT_NAME_LOOKUP is not a fact as defined by the data. EMPLOYEE_HISTORY is a factless fact, but is this how you want to use it for the reporting requirements, or should it be used as a lookup table for EMPLOYEE to return an employee's current job status? You'll look at these query subjects in more detail later in the course.

Issue 2 is "Query subjects that can behave as facts or dimensions." These items are on the 1..1 side of at least one relationship as well as being on the 1..n side of at least one relationship. These are also known as ambiguous query subjects. Before placing these in a package for reporting, you should investigate these objects to ensure that they do not have the potential of being used in an unpredictable manner. You have already seen that ORDER_HEADER may be used as a dimension in one query scenario and as a fact in another.

3. Under **Issue 2**, to the right of **ORDER_HEADER**, click **Launch Context Explorer** .

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4. If necessary, to view all query subjects, maximize the window and click **Fit All**. The results appear similar as follows:



Here you can quickly see how ORDER_HEADER relates to other query subjects and where potential problems might occur.

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5. Close the **Context Explorer** and continue with the Model Advisor issues.

 Issue 3 is "Query subjects with multiple relationships." This section identifies query subjects that may cause ambiguous query paths. Ambiguity will be removed throughout the modeling process.

6. Close the **Model Advisor** dialog box, and leave Framework Manager open for the workshop.

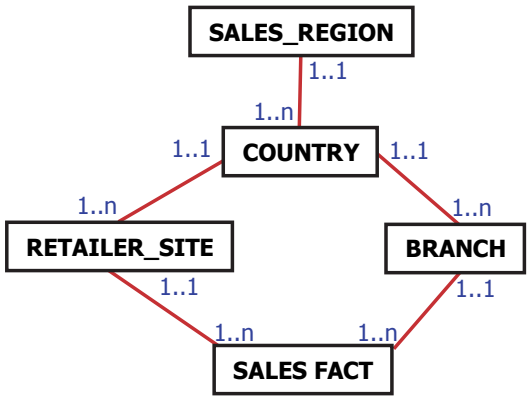
Results:
Prior to modeling the metadata, you analyzed the model for errors and design issues.

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Business Analytics

When is a Query Subject Really Ambiguous?

- COUNTRY, RETAILER SITE, and BRANCH all appear ambiguous based on cardinality
- But these are logical hierarchies



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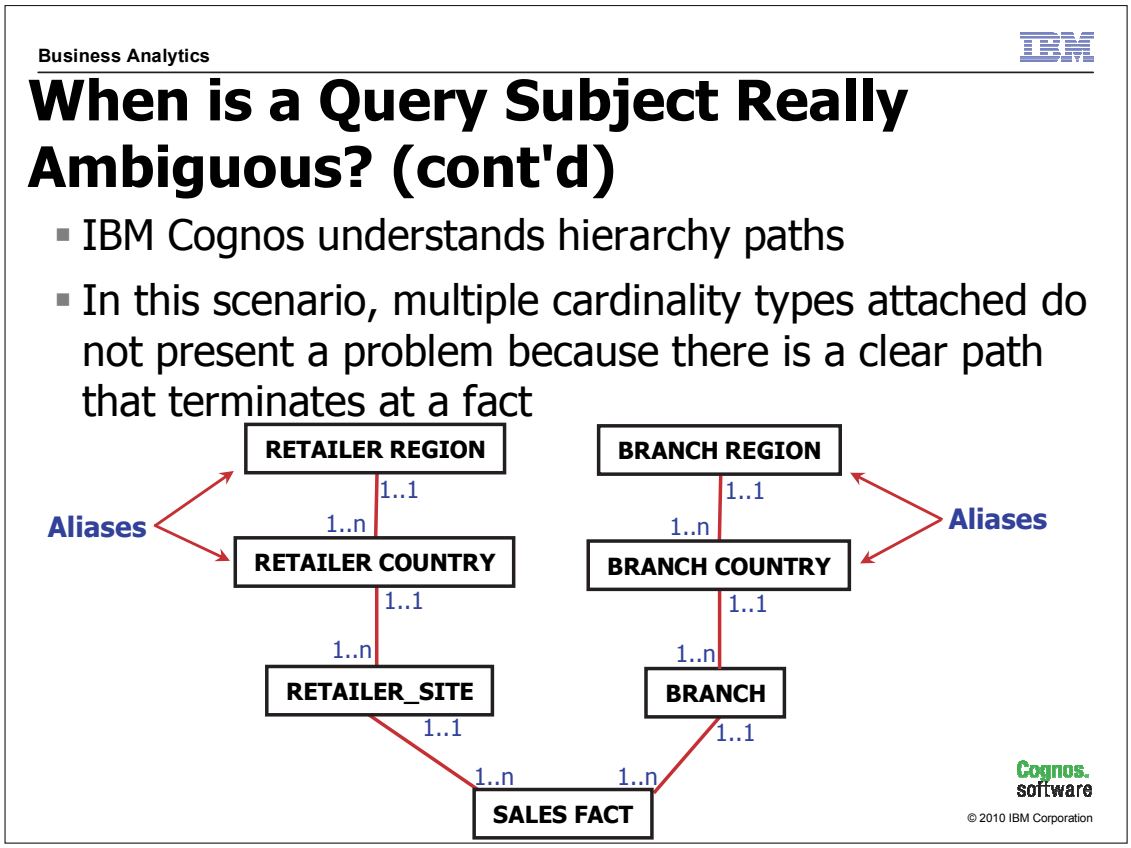
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It is important to understand when query subjects are really ambiguous and how to solve them.

There are logical hierarchies from SALES_REGION all the way to SALES FACT, but there is an ambiguous query path.

In this scenario, multiple cardinality types attached to the query subjects is not an issue, but a clear query path is.

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Using aliases you can remove the ambiguous query paths.

But the query subjects still have multiple cardinalities attached. This is OK because IBM Cognos can traverse the hierarchies and terminate at the actual fact, in this case SALES FACT.

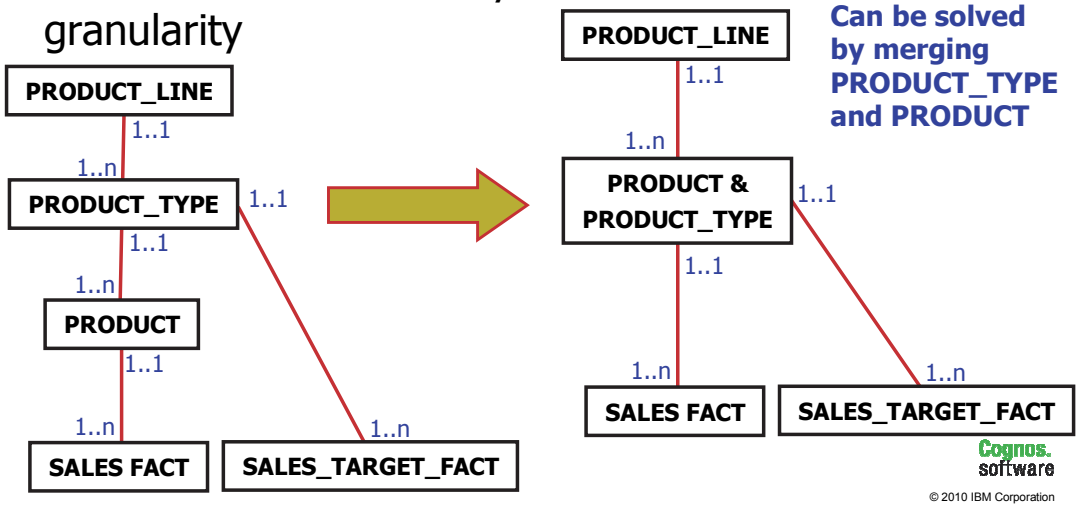
This only becomes an issue if the hierarchy can branch off to different facts at different levels. You will see this example on the next page.

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Business Analytics

When is a Query Subject Really Ambiguous? (cont'd)

- In this case, PRODUCT_TYPE presents a problem
- It branches the hierarchy off at a different level of granularity



Remember querying PRODUCT_TYPE, PRODUCT, and SALES_TARGET_FACT caused PRODUCT to be treated as a fact query subject and generated an unwanted query split resulting in a full outer join? This is because IBM Cognos determined PRODUCT and SALES_TARGET_FACT were fact termination points and that PRODUCT_TYPE was a shared dimension between the two. Based on cardinality, this is the logical choice. But is it what you want?

After merging PRODUCT and PRODUCT_TYPE, there is a clear hierarchy path that terminates at the real fact query subjects, in this case, SALES FACT and SALES_TARGET_FACT.

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Workshop 1: Model in Freehand to Identify Query Usage

This workshop is based on modeling Recommendation 4: Model in freehand to identify query usage.

You have just been asked to analyze a Framework Manager model based on The Great Outdoors Company operational database, and to make recommendations on how to enhance the model so that authors will achieve predictable results.

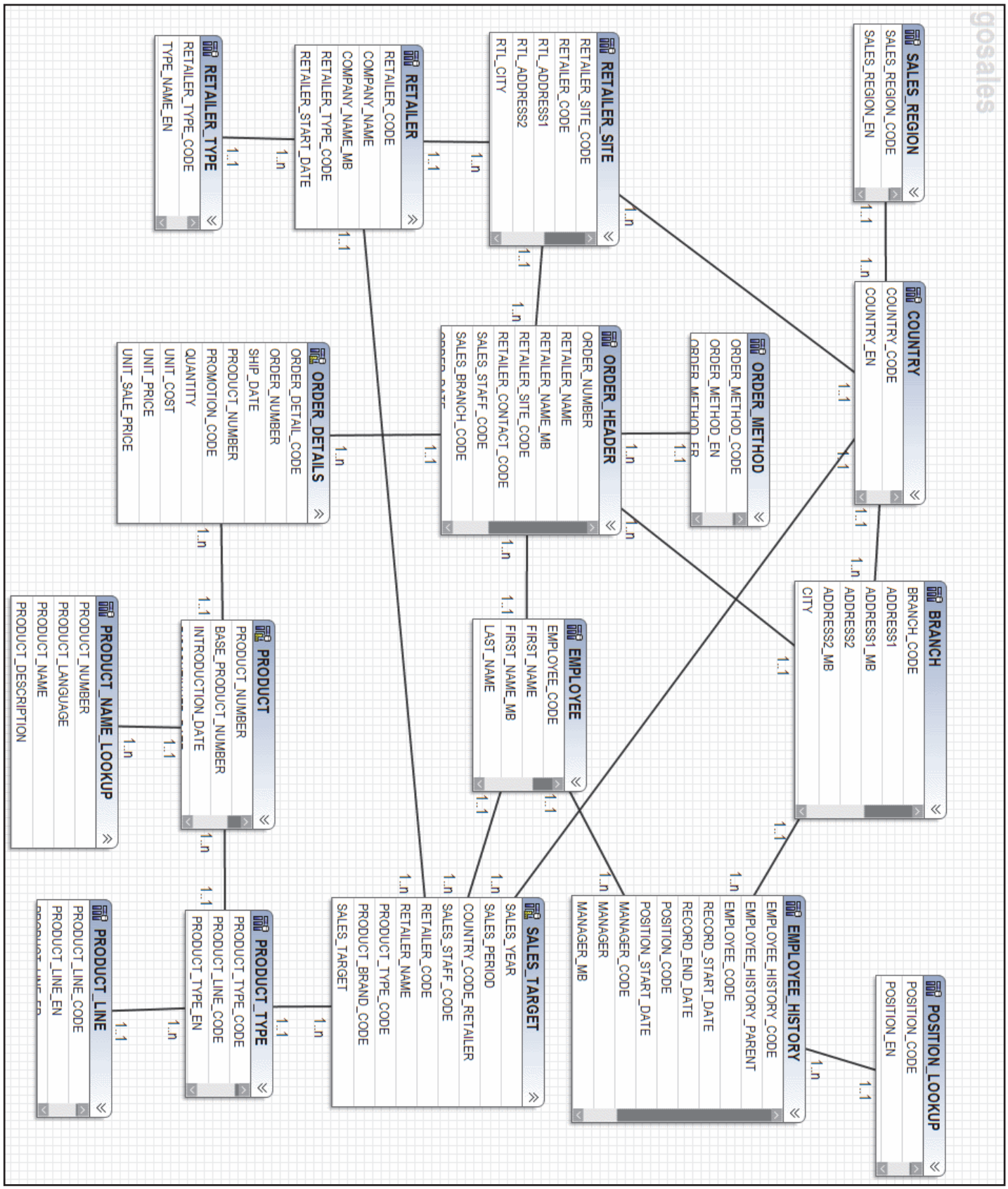
To do so, analyze the following diagram to identify:

- All groupings of related query structures (for example, PRODUCT_LINE, PRODUCT_TYPE, and PRODUCT). These can be consolidated into a single author-friendly model query subject for presentation
- All facts (query subjects whose relationships are all on the 1..n side)
- Any ambiguous query subjects that can behave as either facts or dimensions (these can be resolved through a process of creating aliases to remove ambiguous query paths or by merging query subjects).

Use the three diagrams on the following pages to identify the items in each task above.

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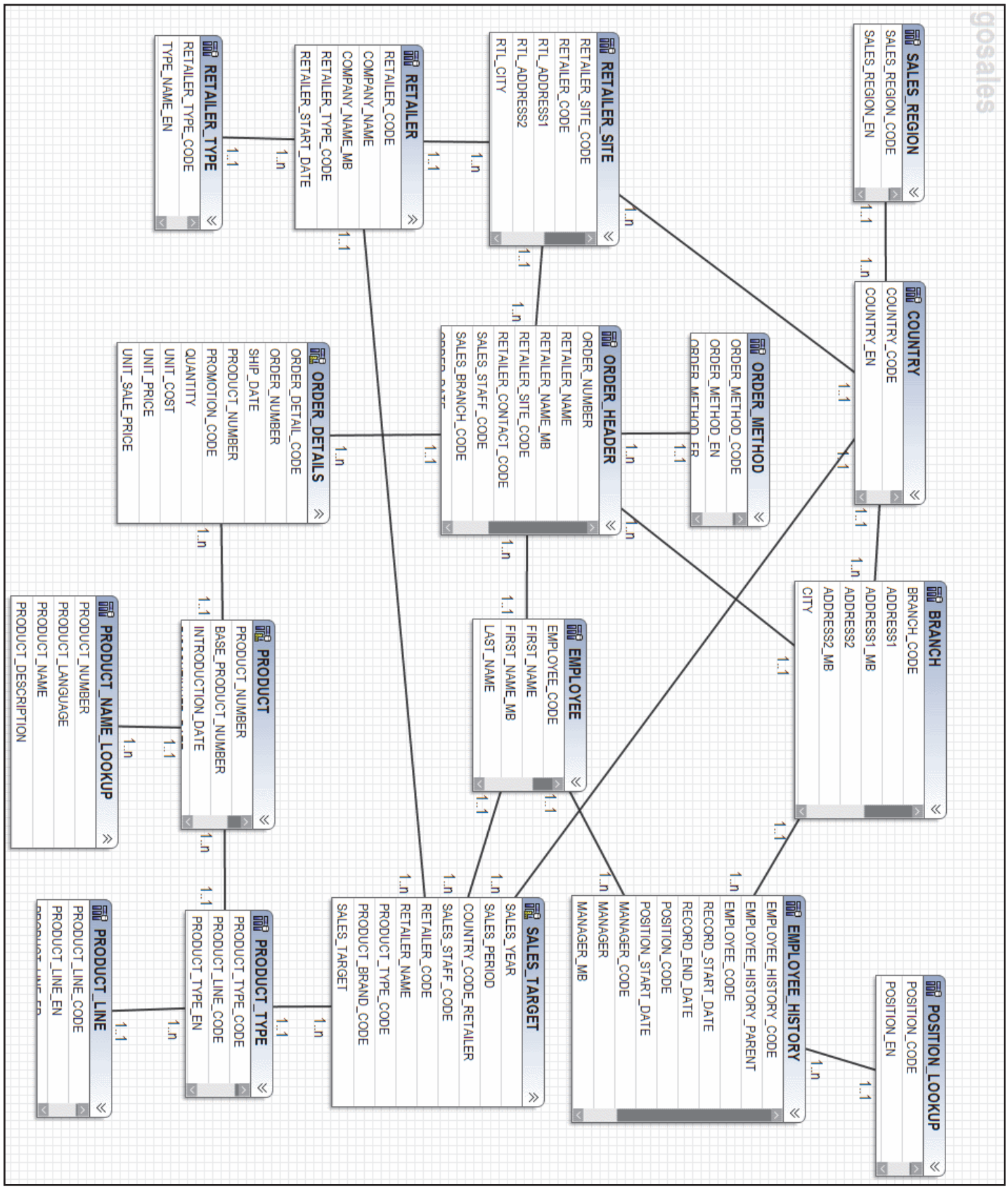
Workshop 1: Identify Groupings



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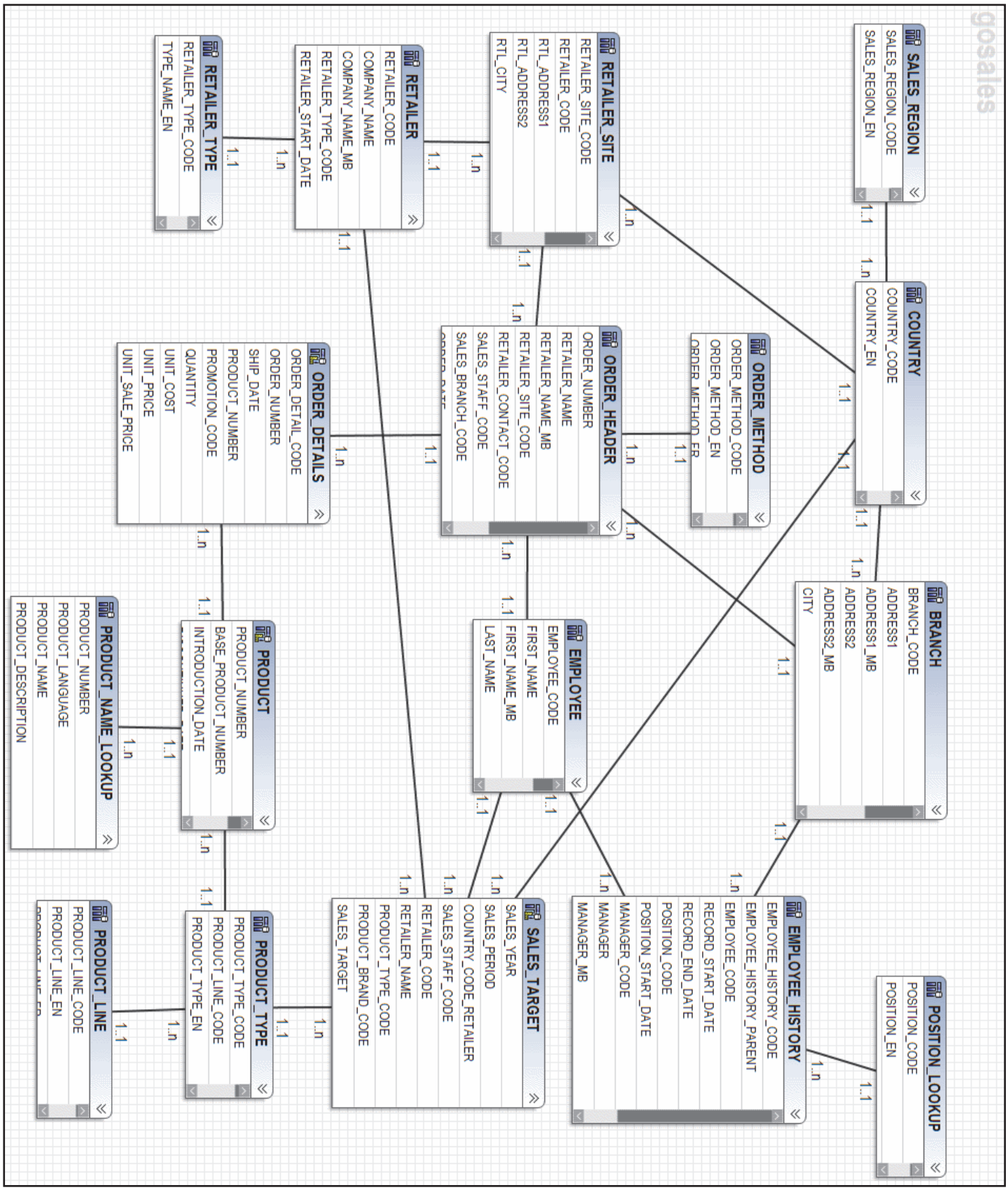
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Workshop 1: Identify Facts



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Workshop 1: Identify Ambiguous Query Subjects



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Workshop 1: Solution

These solutions will be explained in further detail and implemented throughout the next few modules.

Groupings:

The Identify Groupings page illustrates the first step in a star schema modeling solution, logically grouping related query structures:

- SALES_REGION, COUNTRY, BRANCH, EMPLOYEE_HISTORY, EMPLOYEE, and POSITION_LOOKUP to make up a **Staff by Location** dimension
- SALES_REGION, COUNTRY, RETAILER_SITE, RETAILER, and RETAILER_TYPE to make a **Retailer** dimension
- PRODUCT, PRODUCT_TYPE, PRODUCT_LINE and PRODUCT_NAME_LOOKUP to create a **Product** dimension

ORDER_METHOD is a stand-alone dimension and presents no issues.

There are also two other groupings, although not in the initial requirements, that may make sense. Sometimes during the modeling process the data reveals other alternatives that you can choose to take advantage. The ones found here are:

- SALES_REGION, COUNTRY and BRANCH to create a **Branch by Location** Dimension, which can then link to the grouping of ORDER_HEADER and ORDER_DETAILS in order to identify which branch a sale was made from
- SALES_REGION and COUNTRY to create a **Sales Target by Location** dimension

All of the above groupings will be used as dimensions to meet reporting requirements.

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Facts:

ORDER_DETAILS is a fact as it only has 1..n cardinalities attached.

SALES_TARGET is a fact as it only has 1..n cardinalities attached.

EMPLOYEE_HISTORY is also a fact even though it contains no measures. However the requirements for this application are to report on employees' current positions. Later in the modeling process, a filter will be used to filter on the current position and therefore change the nature of the EMPLOYEE to EMPLOYEE_HISTORY relationship to 1..1 to 1..1.

PRODUCT_NAME_LOOKUP is identified as a fact as it only has 1..n cardinalities attached. In the data, this is not a fact and will be corrected with a filter that will change the cardinality to 1..1.

Ambiguous Query Subjects:

COUNTRY is used in multiple query paths and is a good candidate for aliasing.

BRANCH is used in two query paths and is a good candidate for aliasing.

ORDER_HEADER is an ambiguous query subject because it has multiple cardinality types attached with multiple paths. It is not part of a hierarchy with one path.

- ORDER_HEADER is a query subject used as a bridge between most dimensions and the sales facts in ORDER_DETAILS. It contains keys allowing other dimensions to query order details.
- ORDER_HEADER is a good candidate for merging with ORDER_DETAILS to create a new fact query subject. Once these two query subjects are merged, the new query subject will have only 1..n cardinalities attached ensuring it will always be treated as a fact.

RETAILER has multiple cardinality types attached and branches the hierarchy off at a higher level of granularity. It is a good candidate for merging with RETAILER_SITE.

PRODUCT_TYPE has multiple cardinalities attached and branches off at a higher level of granularity. It is also a good candidate for merging with PRODUCT.

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Business Analytics

Summary

- You should now be able to:
 - identify reporting traps
 - describe how IBM Cognos uses cardinality
 - identify when full outer joins are appropriate
 - use tools to analyze the model

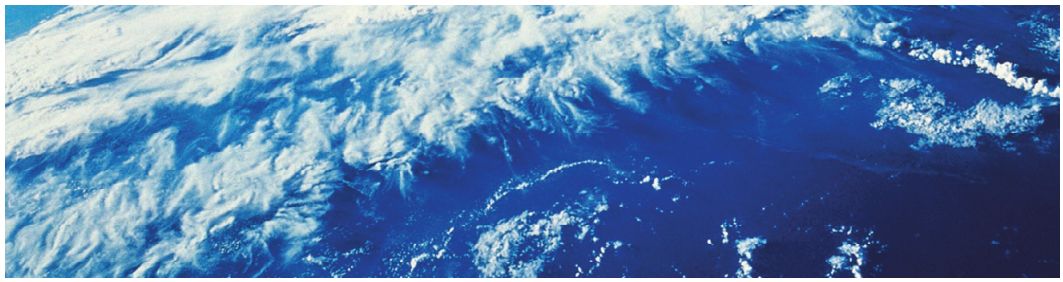
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Model for Predictable Results: Virtual Star Schemas

IBM Cognos BI



Business Analytics

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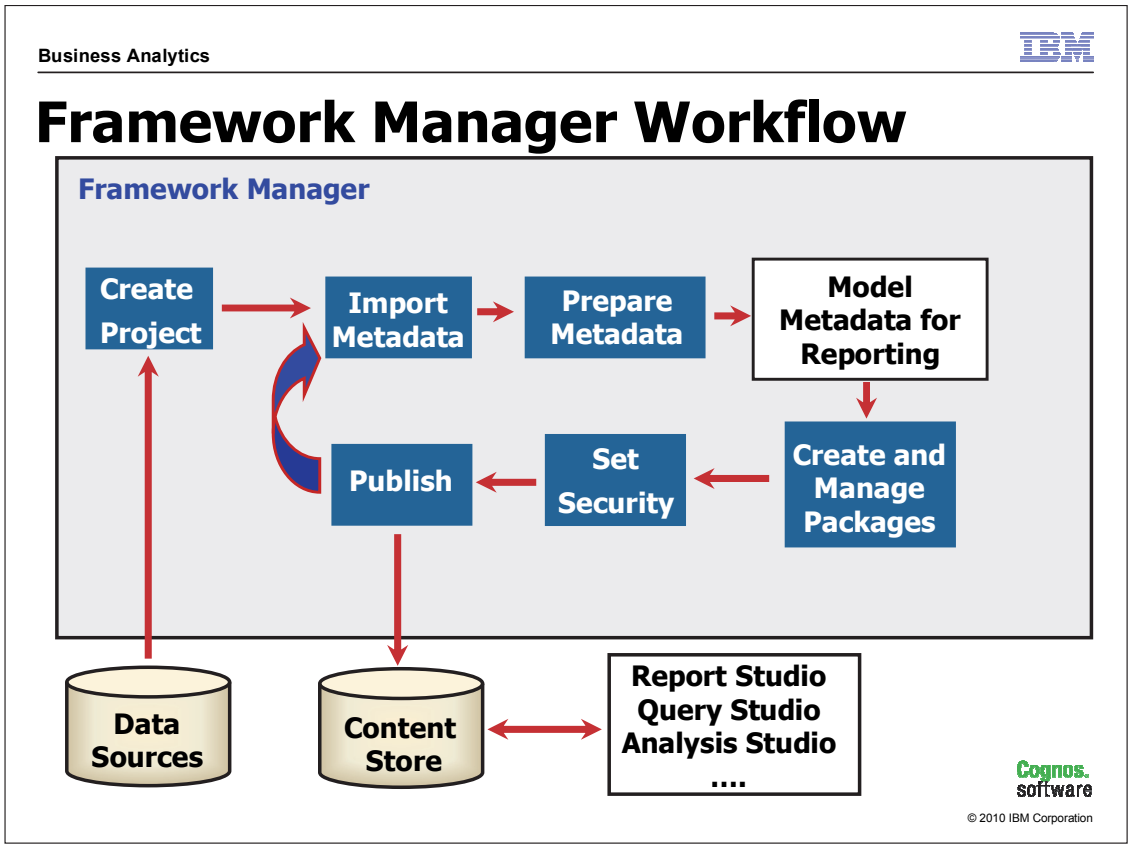
Objectives

- At the end of this module, you should be able to:
 - identify the advantages of modeling metadata as a star schema
 - model in layers
 - create aliases to avoid ambiguous joins
 - merge query subjects to create as view behavior

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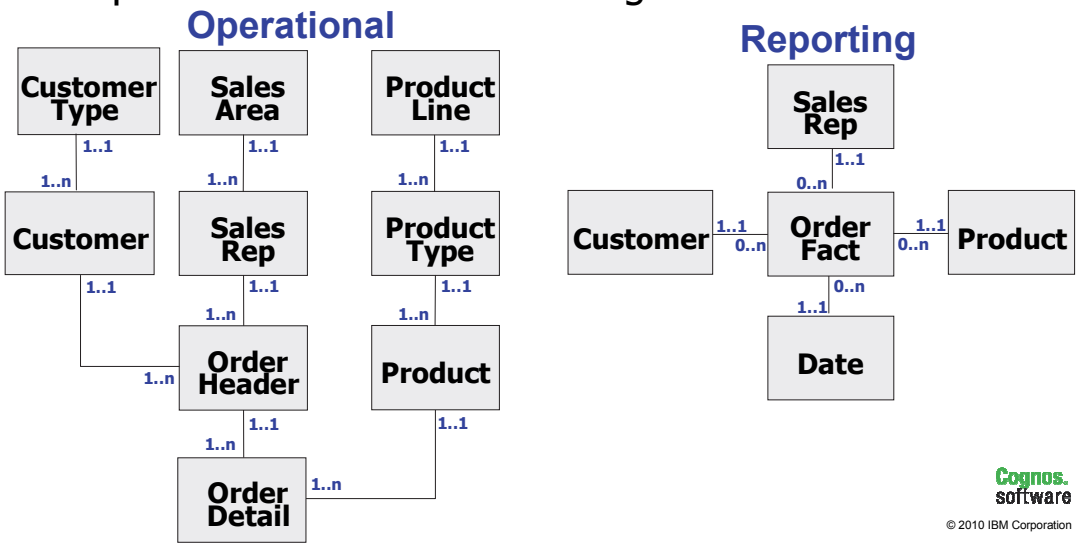
This module deals with modeling as a virtual star schema in order to ensure predictable results.

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Modeling Operational vs. Reporting Databases

- Reporting databases (star schema structure) typically require less metadata modeling

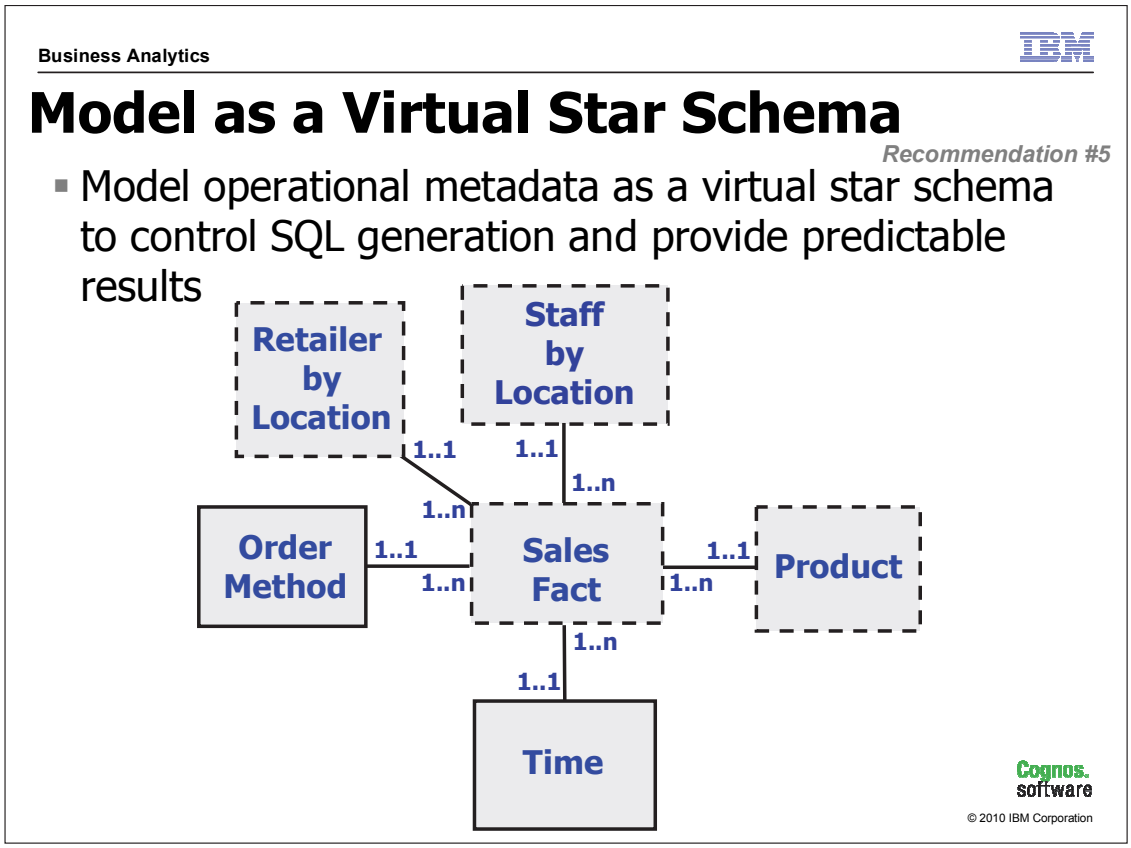


Operational databases typically require more of a metadata modeling effort in Framework Manager since they are confusing for users to understand and can present several reporting traps.

This course focuses on modeling an operational source because it illustrates more modeling scenarios that may apply to any database, both operational and reporting.

Star schema databases will likely require much less modeling since they are already designed for reporting. However, not all reporting database designs are immune to design issues and may require some of the very same techniques found in this course.

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In the slide example, query subjects with dashed borders represent model query subjects that have been used to create views of the data at run time. These views organize and/or control the SQL generation, which helps to provide an easy to use model and predictable results.

It is important to understand that modeling an operational data source as a virtual star schema may not meet all your business needs. However, as a general rule, it can provide predictable results to a broad and general audience.

When you model an operational or reporting data source as a star schema, you are not changing the underlying, data structure. You are creating a virtual star schema that allows IBM Cognos to generate the correct SQL for predictable results.

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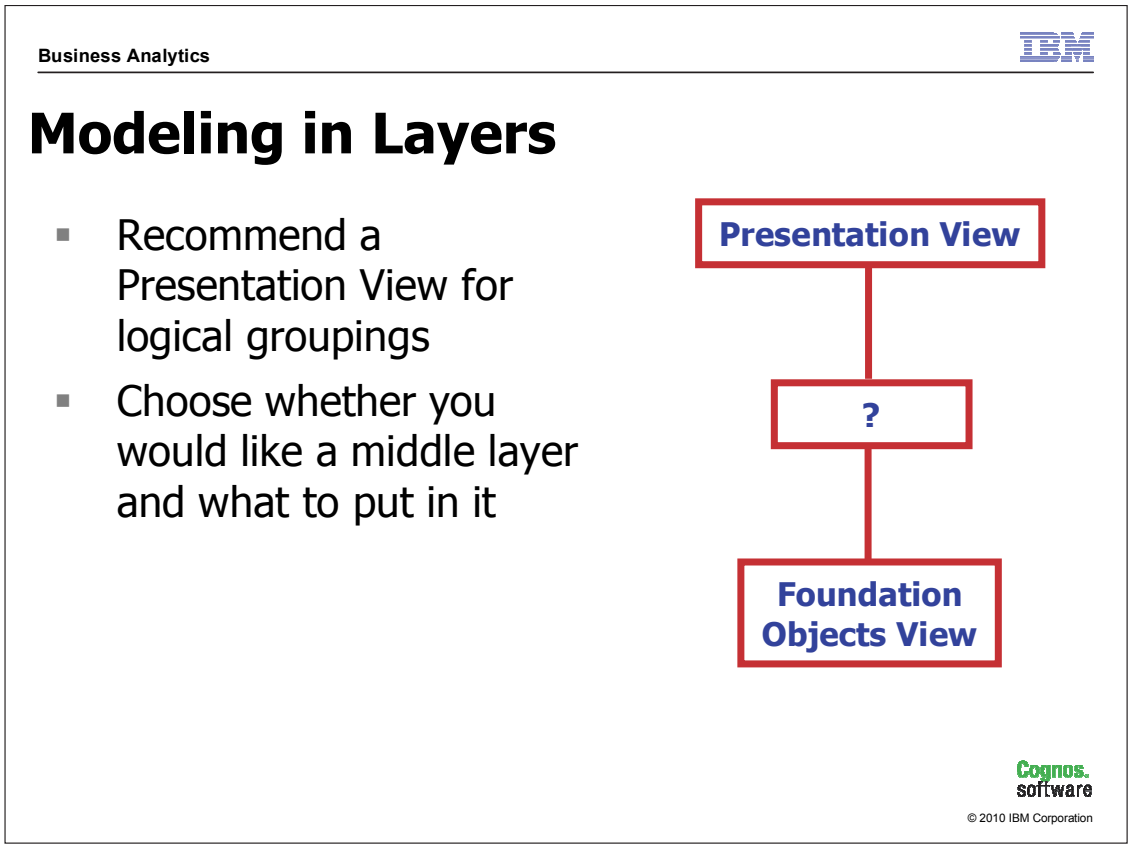
What are the Advantages of Modeling as a Star Schema?

- Subject area marts (star schema groupings)
- Simpler for the user to understand - fewer query subjects
- Adaptable and extendable - you can easily add and reuse facts and dimensions
- Conformed dimensions prevent data silos - facts are related to one another through dimensions

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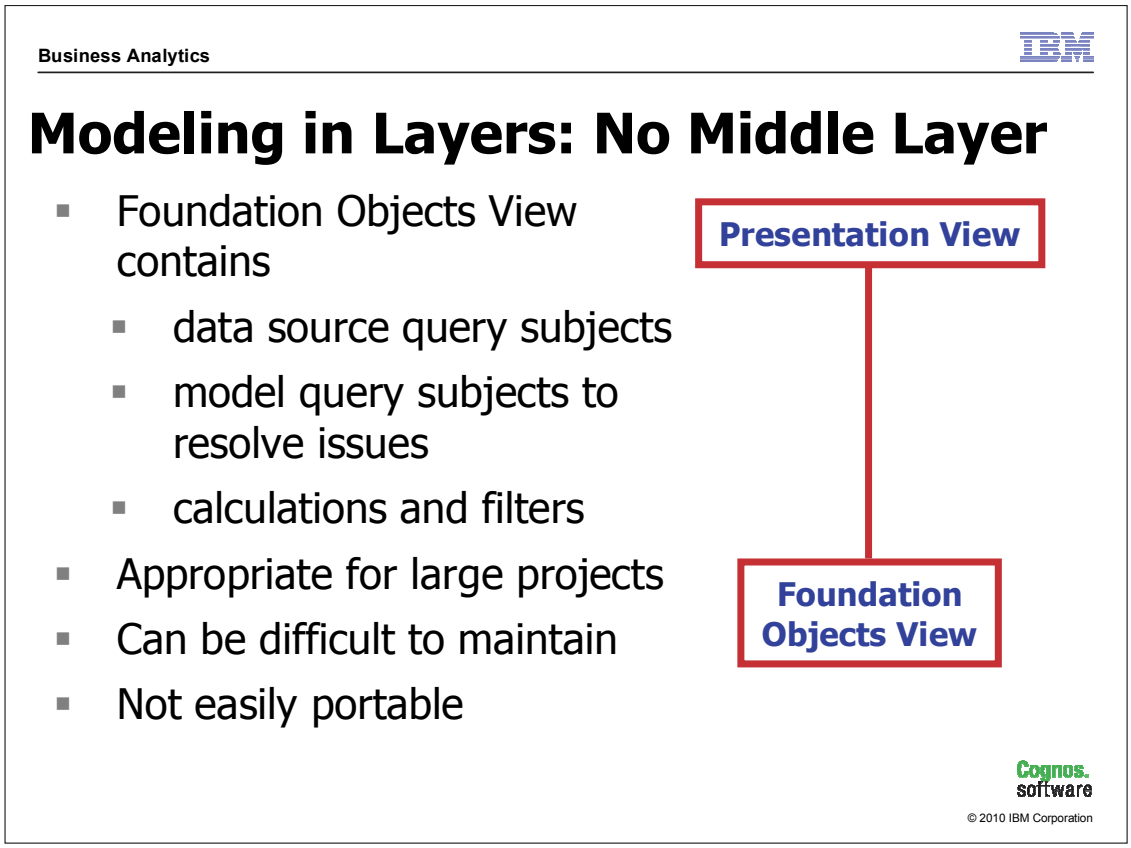


A Presentation View contains only the star schema groupings. This logically groups objects appropriate for the business and easily allows you to create separate packages for different reporting needs.

The decision to have another layer between the Foundation Objects View and the Presentation View involves several factors. For example, what is the size of the model? Do you need to reduce development time rather than ensure ease of maintenance later in the modeling cycle?

The next three slides investigate some approaches.

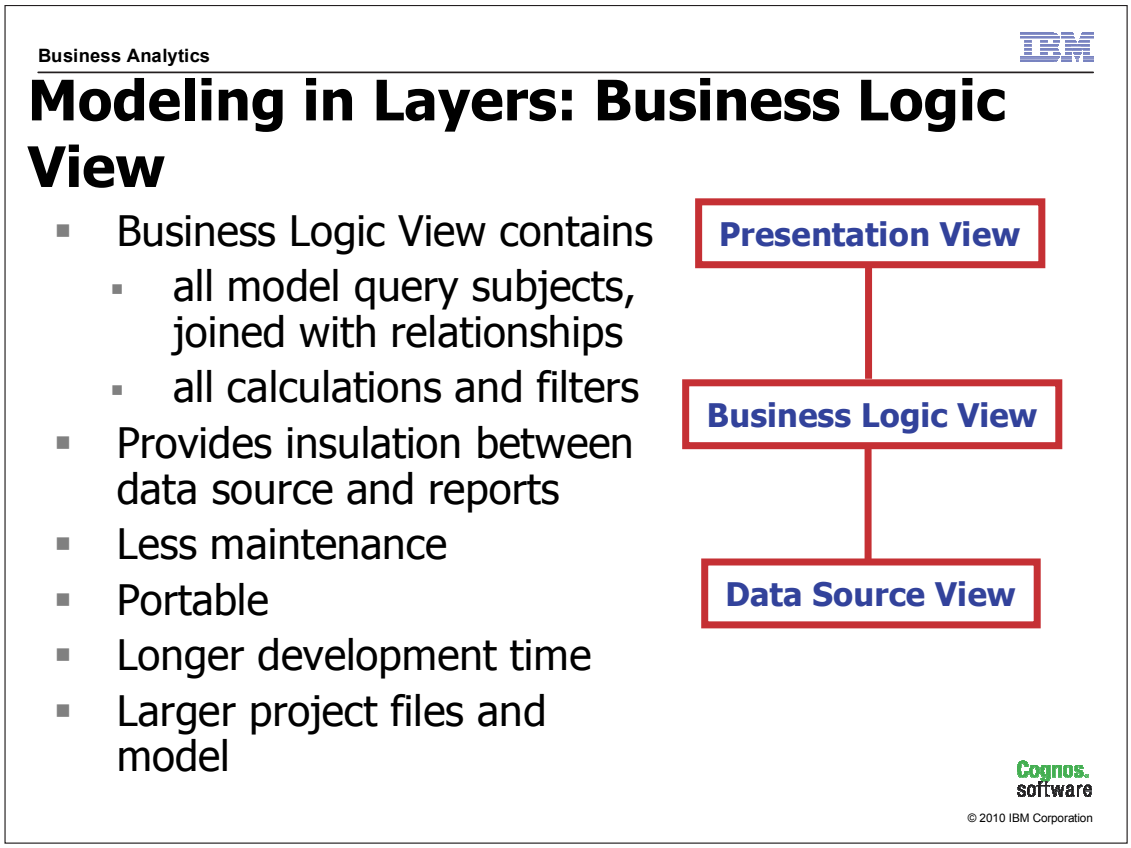
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This method requires the least duplication of query subjects, keeping the physical size of the project files to a minimum. It needs less time for development, but increased maintenance time when in production. For example, a post-production port of the databases from one database vendor to another may require repairing reports. This is because the Presentation View objects used by report authors are shortcuts to the query subjects in the lower layer, which now have a new source. You will also need to remodel the new metadata to meet the reporting requirements.

This method is best suited to large implementations or situations where a data warehouse has already been set up to accommodate the majority of the specialized business logic for reporting. If you expect ongoing changes to the underlying data structure, this may not be a suitable option.

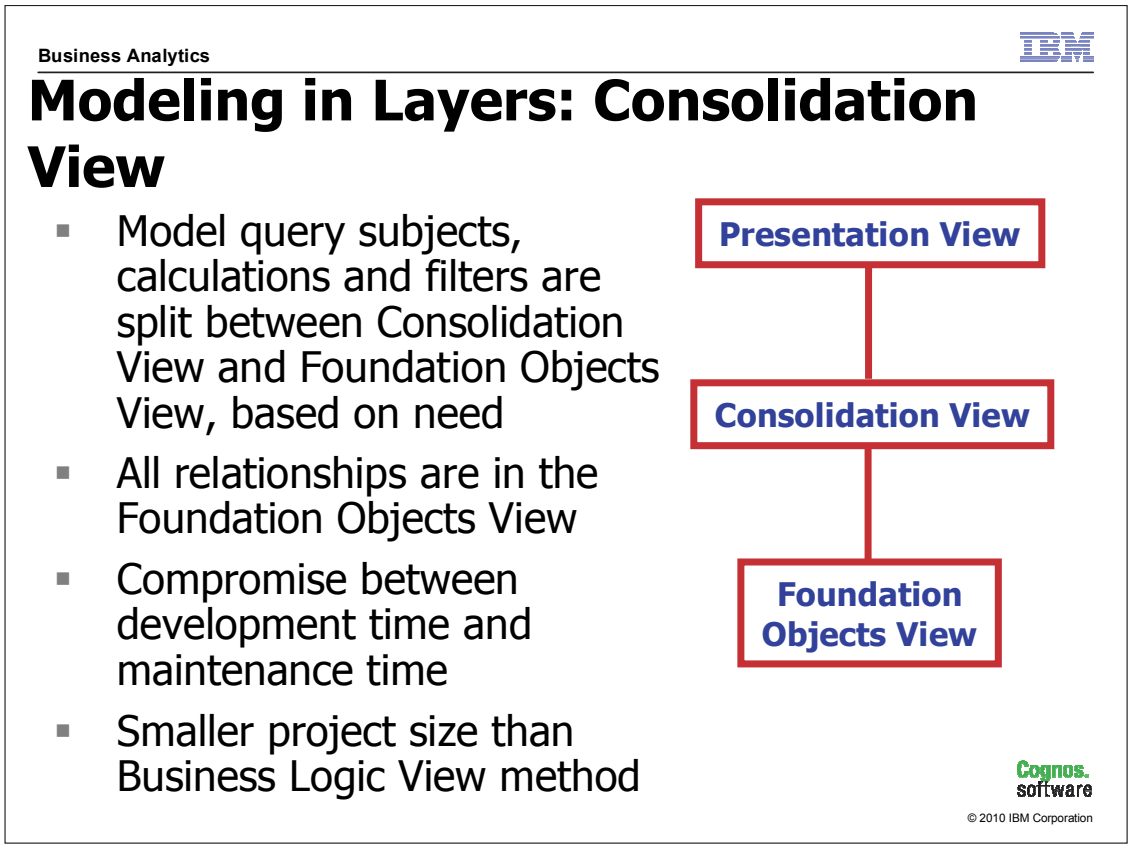
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Creating the model query subjects (and rebuilding all their relationships) in the Business Logic View takes extra work but it provides a layered structure for improved model maintenance, readability and portability.

An example of simpler maintenance with this layered model is a post-production port of the application from one database vendor to another. The existing reports are all based on the Business Logic View layer objects. All you have to do is re-map those model query subjects to the new database vendor data source query subjects. There is no need to rebuild the reports, or remodel the metadata.

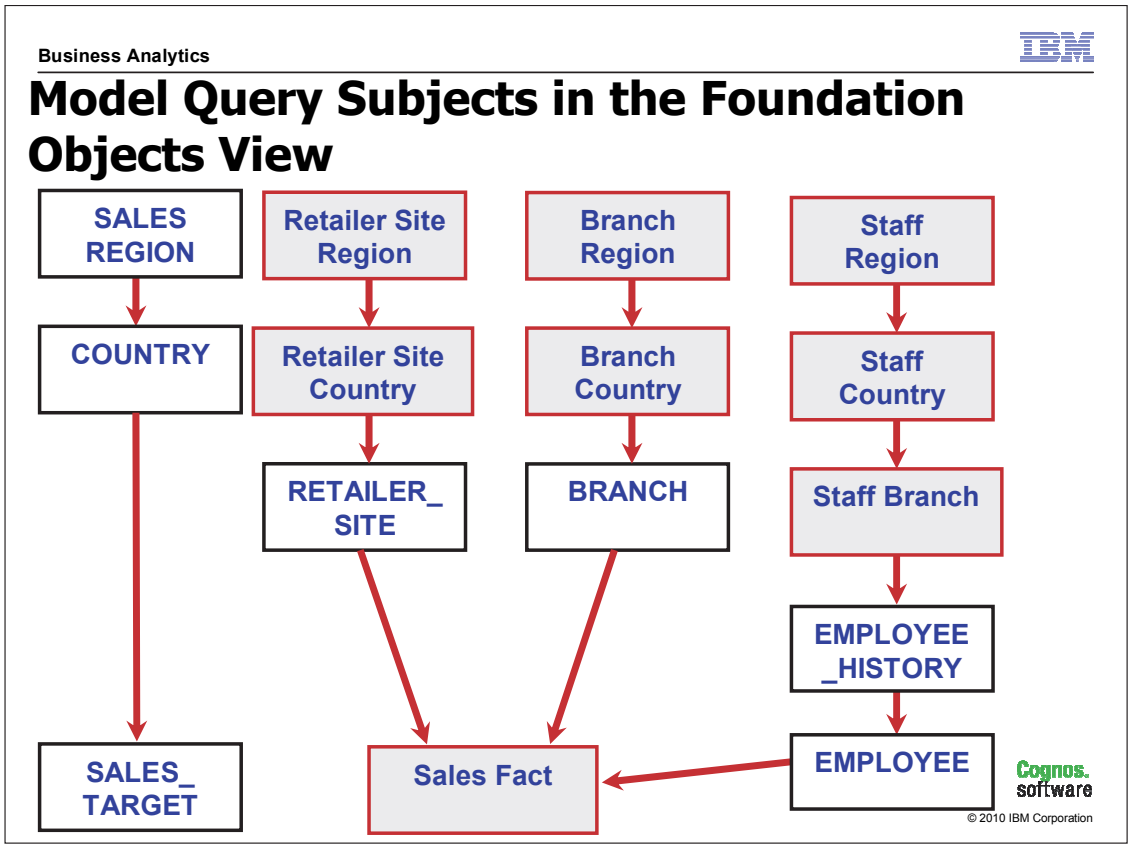
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This compromise between the previous two methods only creates model query subjects in the lowest layer to resolve reporting issues (this means that the model query subjects have relationships attached). Keeping all relationships in the lowest layer allows the middle layer to simply act as a consolidation layer with some business logic (where required). For example, this view is where snowflake dimensions are consolidated. This view also acts as an insulation layer between reports and the data source.

Calculations may appear in either the lowest or the middle layer, depending on where the model query subject is created. A model query subject that is created to resolve a reporting issue will be created in the lowest layer. Therefore, any calculations required for that object will be defined in the lowest layer.

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This course will use the Consolidation View approach in the demos and workshops. In this module, you will focus on the early stages of the Foundation Objects View layer.

Once the Foundation Objects View layer is completed later in the course, it will contain:

- all data source query subjects
- any model query subjects required to resolve reporting issues
- some calculations and filters where appropriate

The above diagram identifies, in the grey boxes (with mixed-case text), the model query subjects used to resolve reporting issues. Sales Fact is used to create a view of ORDER_HEADER and ORDER_DETAILS, thereby controlling the SQL generation, and all others are used to create aliases to control query paths.

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Demo 1: Create Alias Model Query Subjects to Avoid Ambiguous Query Paths

Purpose:
In an earlier exercise, you identified a situation where there was an ambiguous query path between query subjects. SALES_REGION is above COUNTRY in this hierarchy and therefore has the same ambiguous path to ORDER_ DETAILS. You will resolve the problem by creating aliases for SALES_REGION and COUNTRY.

Component: **Framework Manager**

Project: **GO Operational**

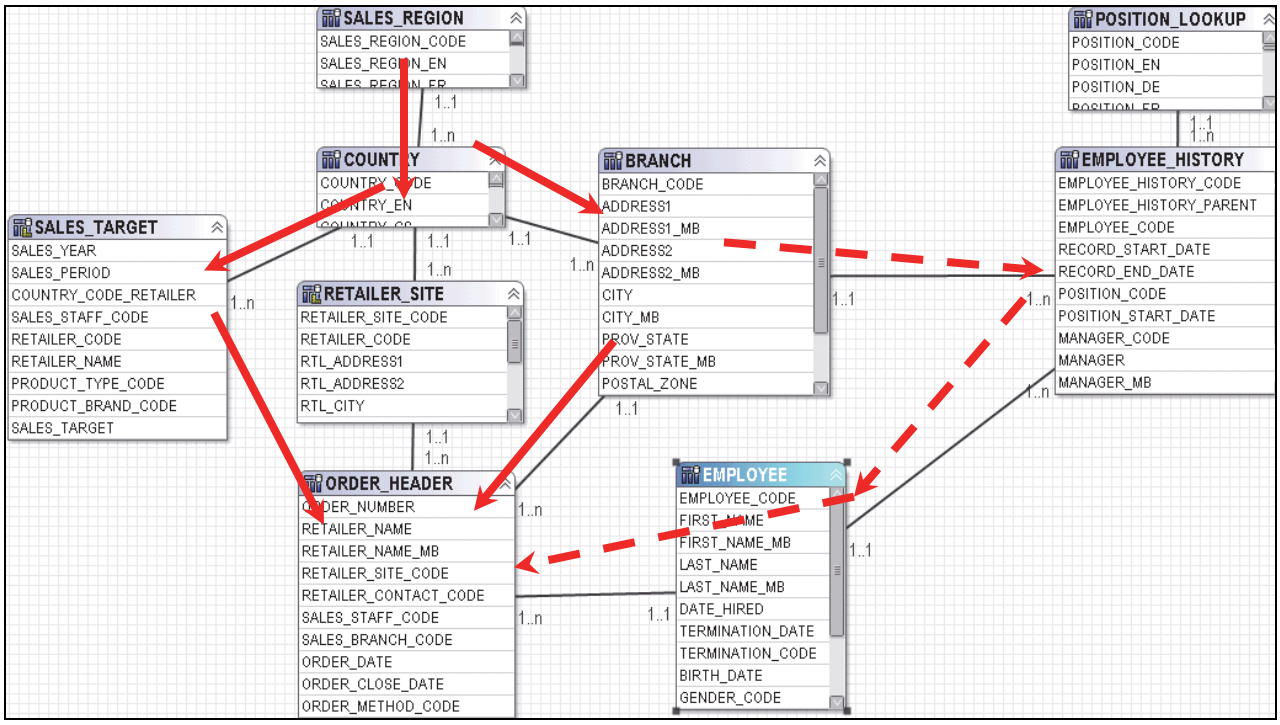
Task 1. Review the 'ambiguous join' reporting trap.

1. In **Framework Manager**, close any projects that may be open, and then open the **GO Operational** model located at **C:\Edcognos\B5152\ CBIFM-Start Files\Module 7\GO Operational**.
2. If prompted, log in as User ID **admin**, and Password **Education1!**.
3. In the **Project Viewer** pane, in the **gosales** namespace, right-click **COUNTRY**, and then click **Launch Context Explorer**.
4. If only the **COUNTRY** table displays in **Context Explorer**, click **Show Related Objects** .
5. Click **BRANCH**, and then click **Show Related Objects**.
6. Click **EMPLOYEE_HISTORY**, and then click **Show Related Objects**.

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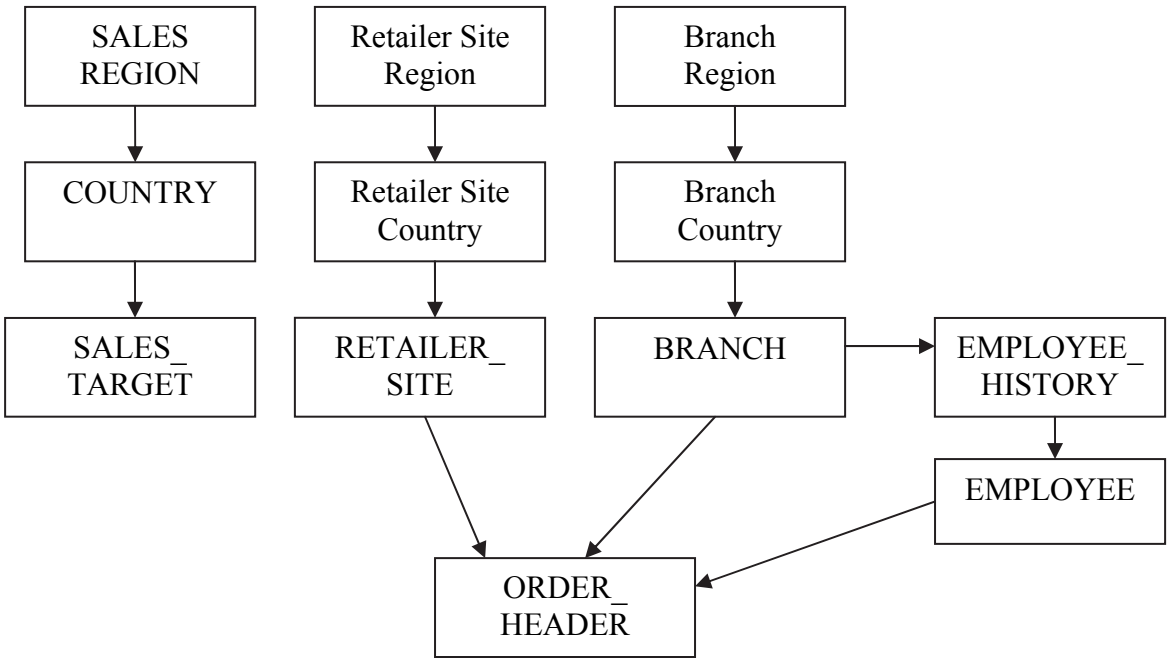
7. If you wish, arrange the diagram as shown below to better see the hierarchy structure:



SALES_REGION and COUNTRY have two separate paths that lead to ORDER_HEADER (or three if you include the route through EMPLOYEE_HISTORY and EMPLOYEE). You want to resolve ambiguity by creating three separate aliases of SALES_REGION and COUNTRY (so that each can be linked to just one of the paths to ORDER_HEADER and ORDER_DETAIL). Keep the original SALES_REGION and COUNTRY to link to SALES_TARGET.

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You will achieve the following design at the end of this demo:



8. Close the **Context Explorer**.

Task 2. Create Region aliases as model query subjects.

1. In the **Project Viewer** pane, right-click **gosales**, point to **Create**, and then click **Query Subject**.
2. Name the query subject **Retailer Site Region (alias)**, and then, with **Model** selected, click **OK**.
3. Expand **Foundation Objects View>gosales>SALES_REGION**.

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4. Add the following query items by double-clicking them.

 SALES_REGION_CODE
 SALES_REGION_EN

 This alias could also have been created by expanding SALES_REGION in the Project Viewer, selecting the two query items, right-clicking one of them, and clicking Merge in New Query Subject. Both methods have the same results.

 You will include only the columns your report authors will require. Later in the course, you will replace SALES_REGION_EN with a calculation that dynamically picks up the appropriate language column based on the language setting of the user's computer.

 You should rename the items to be more user-friendly before you make copies.

5. Click **OK**, and then, in the **Project Viewer** pane, rename the query items to:

 - **Retailer Site Region Code**
 - **Retailer Site Region**

6. Copy and paste **Retailer Site Region (alias)** in the **gosales** namespace, and then rename the copy to and its two query items as follows:

 - **Branch Region (alias)**
 - **Branch Region Code**
 - **Branch Region**

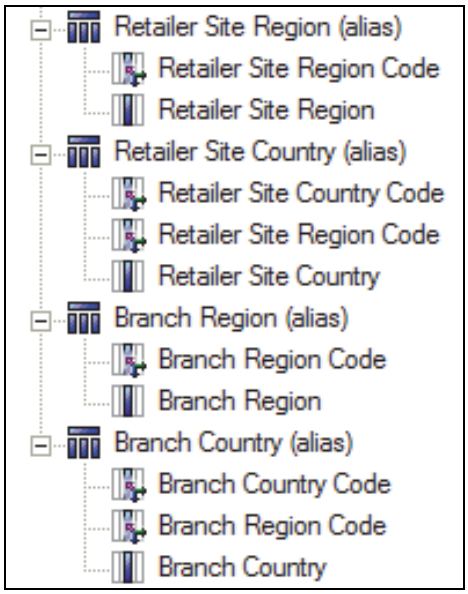
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Task 3. Create Country aliases as model query subjects.

1. Repeat Task 2 to create two aliases of **COUNTRY** as follows:
 - **Retailer Site Country (alias)**
 - **Retailer Site Country Code** (from COUNTRY_CODE)
 - **Retailer Site Region Code** (from SALES_REGION_CODE)
 - **Retailer Site Country** (from COUNTRY_EN)

 and
 - **Branch Country (alias)**
 - **Branch Country Code**
 - **Branch Region Code**
 - **Branch Country**
2. Drag **Retailer Site Country (alias)** below **Retailer Site Region (alias)**.

 The results appear as follows:



You now have aliases for two of the three relationships between Region/Country and ORDER_HEADER/ORDER_DETAILS. You will create the third one (for employees) in a workshop.

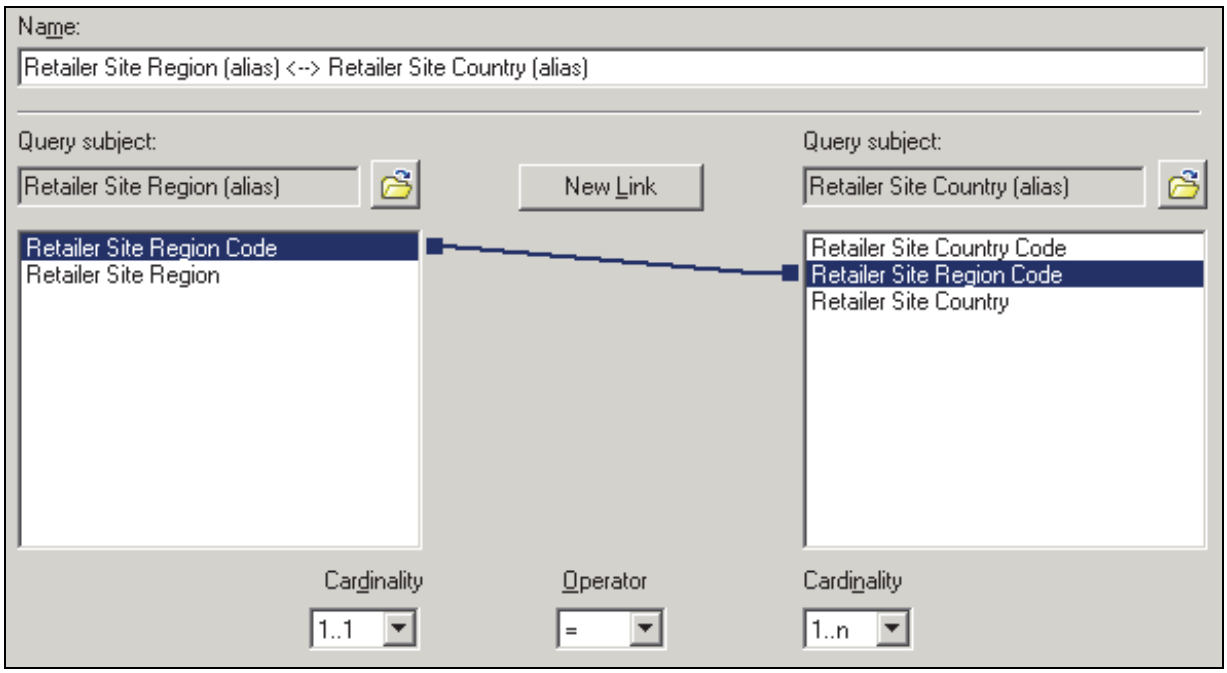
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Task 4. Create relationships.

1. In the **Project Viewer** pane, select the following items:
 - **Retailer Site Region (alias)>Retailer Site Region Code**
 - **Retailer Site Country (alias)>Retailer Site Region Code**
2. Right-click one of the selected items, point to **Create** and then click **Relationship**.

 The results appear as follows:



You now have a relationship between the two query subjects on a common key with the correct cardinality. Again, using this method, the first object selected will be on the 1..1 side of the relationship. You can modify the cardinality after the fact if it does not meet your needs.

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3. Click **OK**.

 You are asked if you would like to replicate the existing underlying relationships. In this case you do not want to recreate all underlying relationships since you only require the one you just created, which is used to control the query path for your alias.

4. Click **No**.

5. Repeat steps **1** to **4** to create the relationship from **Branch Region (alias)** (1..1) to **Branch Country (alias)** (1..n) on **Branch Region Code**.

 As shown in the diagram in Task 1, you also want to create relationships between your COUNTRY aliases and the query subjects that lead them to ORDER_HEADER, RETAILER_SITE and BRANCH respectively.

6. Repeat steps **1** to **3** to create the following relationships:

 - **Retailer Site Country (alias)** (Retailer Site Country Code, 1..1) to **RETAILER_SITE** (RTL_COUNTRY_CODE, 1..n)
 - **Branch Country (alias)** (Branch Country Code, 1..1) to **BRANCH** (COUNTRY_CODE, 1..n)

Task 5. Remove old relationships.

1. Right-click **COUNTRY**, click **Launch Context Explorer**, and then click **Show Related Objects**.

 COUNTRY should no longer link to RETAILER_SITE or BRANCH, now that Retailer Site Country (alias) links to RETAILER_SITE and Branch Country (alias) links to BRANCH.

2. Delete the relationship between the following items:

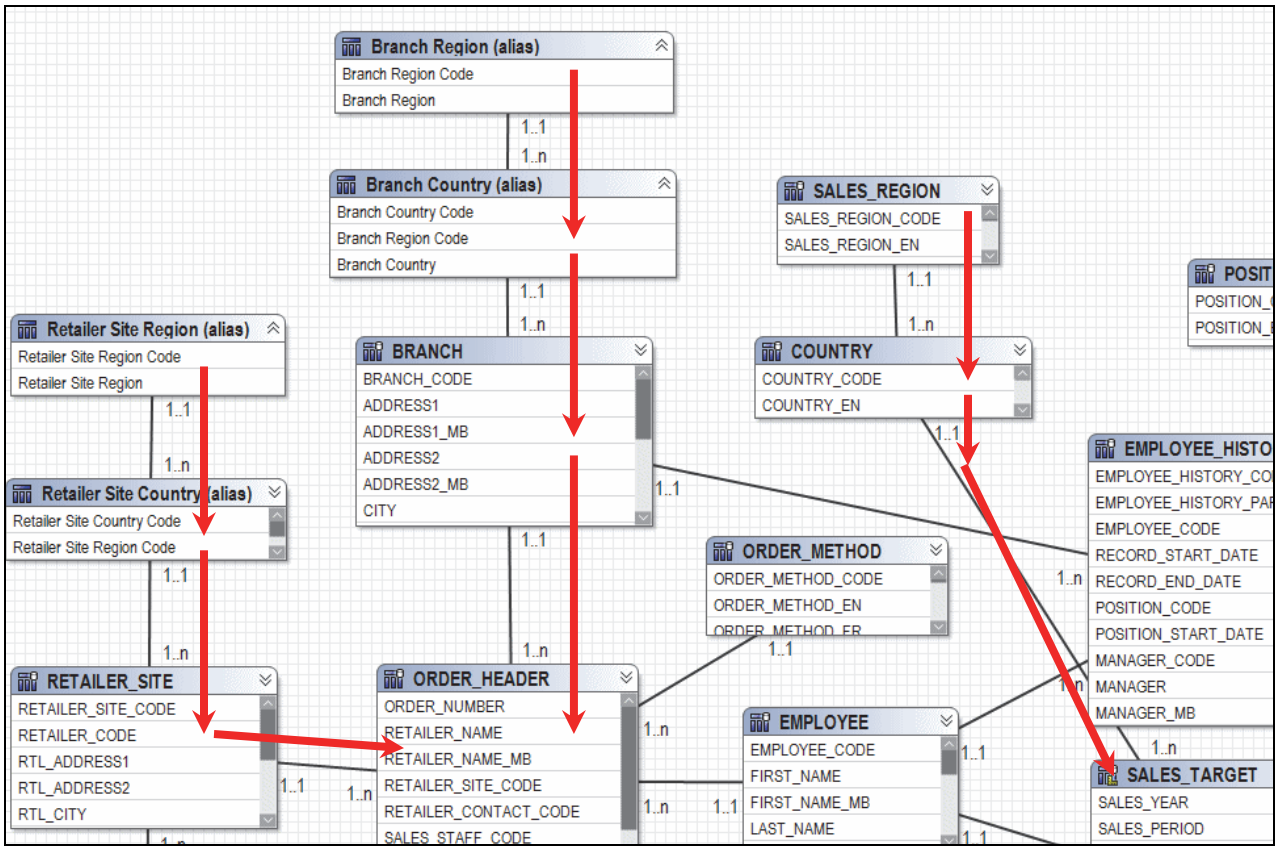
 - **COUNTRY** and **RETAILER_SITE**
 - **COUNTRY** and **BRANCH**

3. Close **Context Explorer**.

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4. Click **Diagram** on the right side of the screen.
5. In the **Diagram**, arrange the objects as shown below:

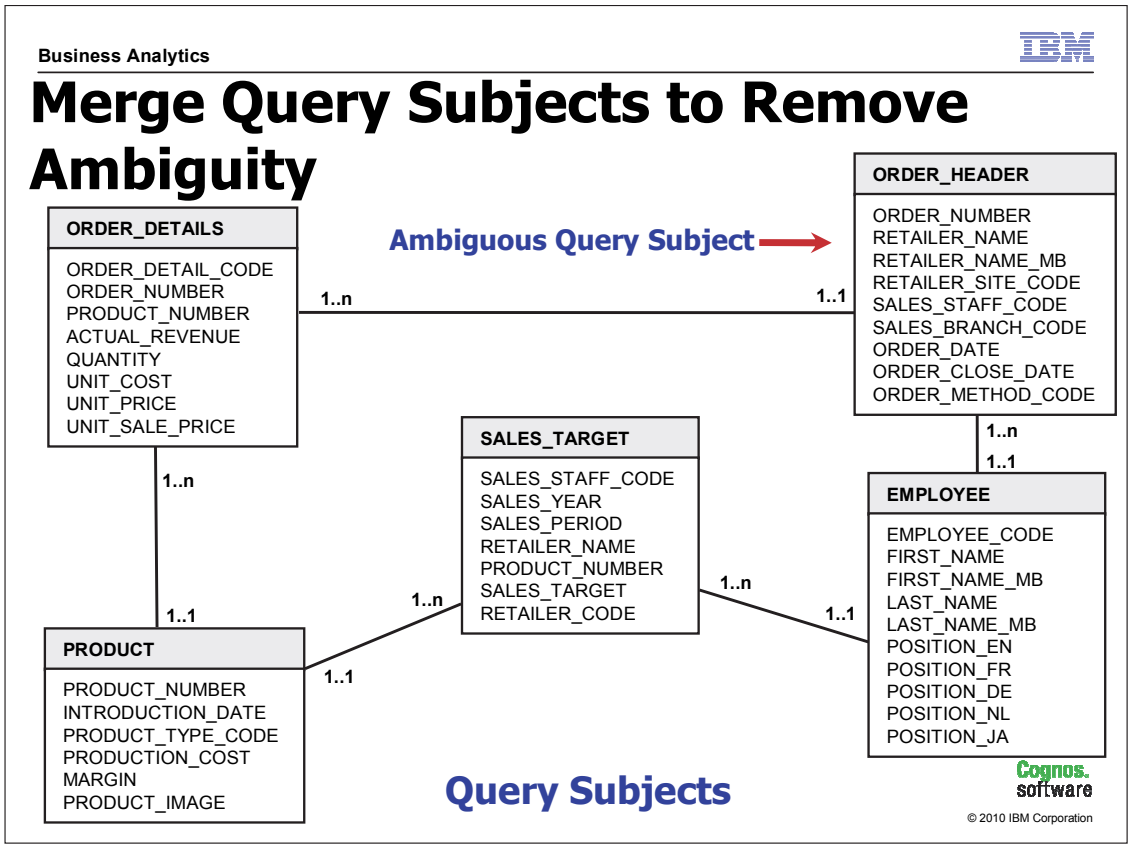


SALES_REGION and COUNTRY no longer have ambiguous query paths. There is now a clear path for retailer queries, branch queries and sales target queries.

6. Save the project and leave Framework Manager open for the next demo.

Results:
You have taken the first steps to resolving a situation where the proper relationship between SALES_REGION/COUNTRY and ORDER_HEADER/ORDER_DETAILS could be ambiguous. You have created multiple copies of the ambiguous query subjects and relationships among them.

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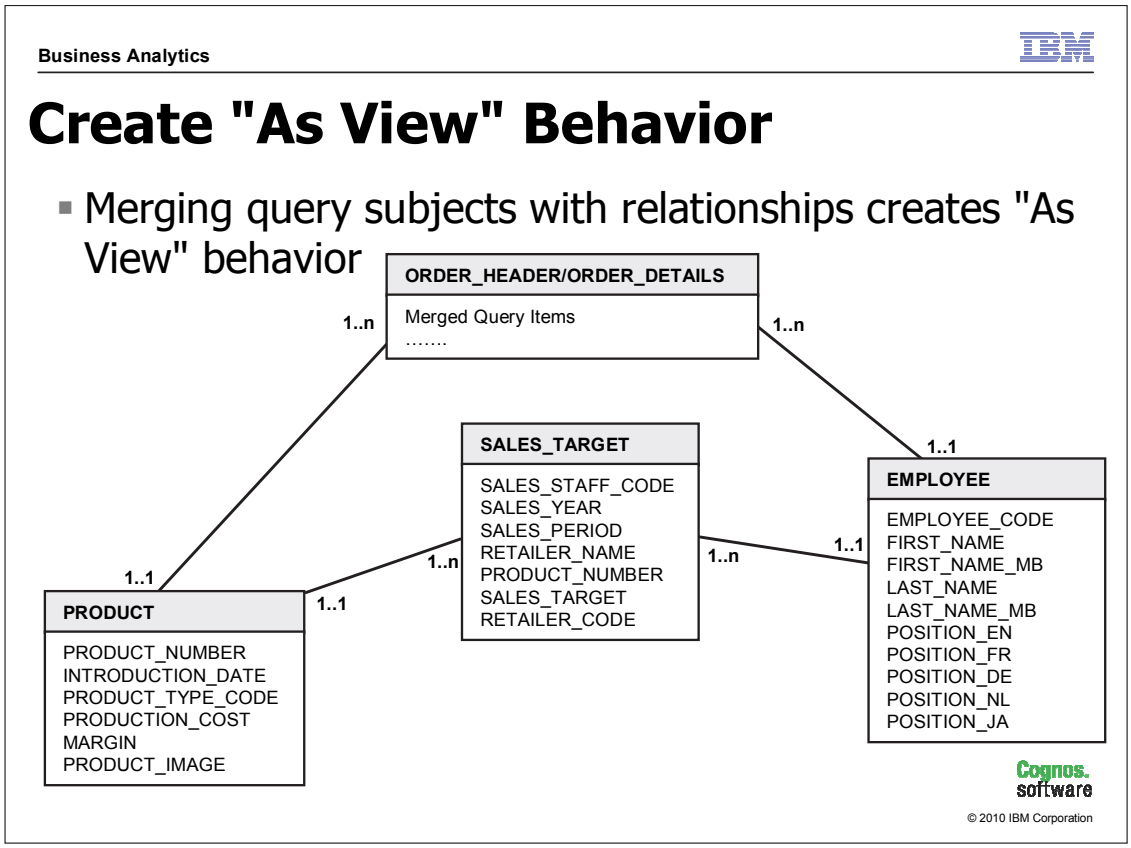


In the example above, the IBM Cognos query engine can identify ORDER_HEADER as a fact or as a dimension depending on the query in which it is used. This is because it has a mix of cardinalities attached to it and contains descriptive information that could be used inappropriately.

ORDER_HEADER is closely related to ORDER_DETAILS and is part of the path for related dimensions, such as EMPLOYEE, in the majority of queries using ORDER_DETAILS.

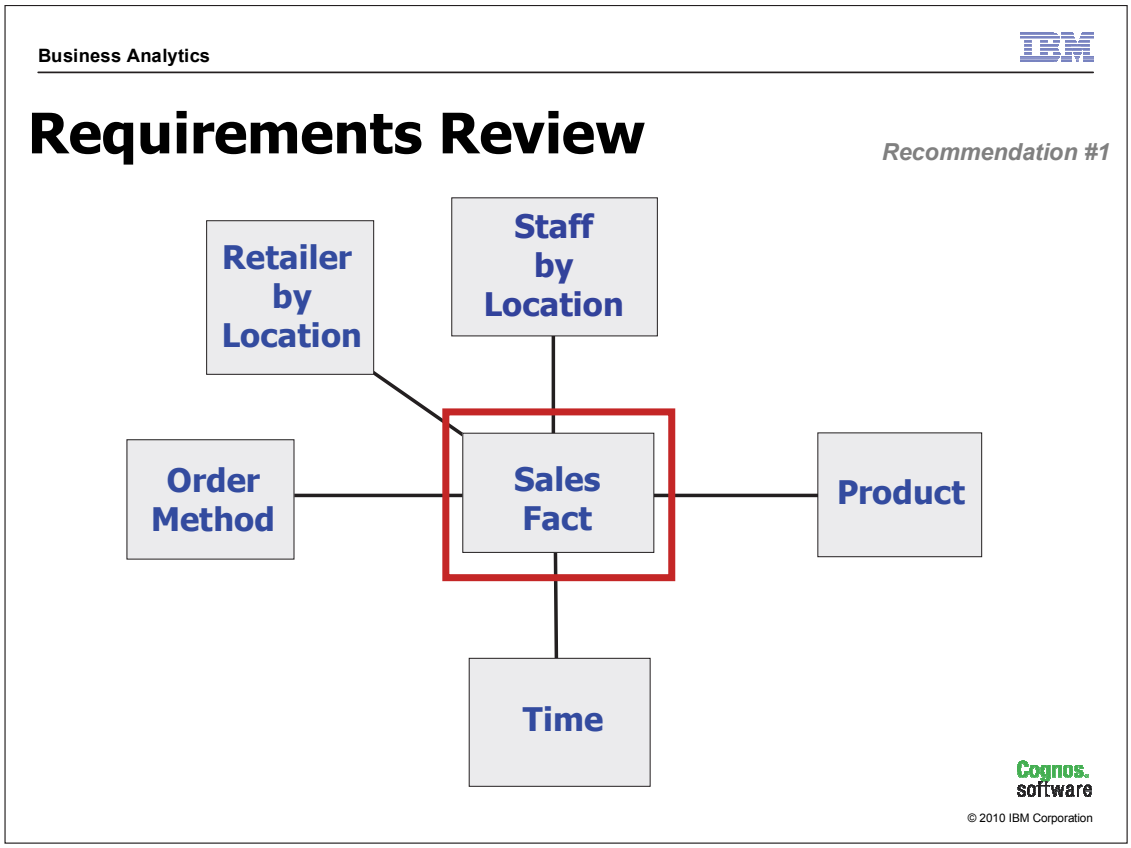
You can merge ORDER_HEADER and ORDER_DETAILS, keeping only required query items, to remove this ambiguity.

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By merging ORDER_HEADER and ORDER_DETAILS and maintaining existing relationships, you create "As View" behavior in which the underlying join between ORDER_HEADER and ORDER_DETAILS is always honored. In this way, these two query subjects will always be treated as one, and in this case, always as a fact.

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In the next demo, you will create a model query subject to meet your Sales Fact requirement.

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Demo 2: Create a Sales Fact Model Query Subject

Purpose:
You have resolved the ambiguous relationship between SALES_REGION/COUNTRY and ORDER_DETAILS by creating aliases of SALES_REGION and COUNTRY as model query subjects. To further simplify the model and remove ambiguity, you will now create a Sales Fact model query subject that merges ORDER_HEADER and ORDER_DETAILS into one model query subject. This is done to ensure that the query path through ORDER_HEADER is maintained when reporting on sales figures and to remove the ambiguity that ORDER_HEADER presents.

Component: **Framework Manager**

Project: **GO Operational**

Task 1. Create a Sales Fact model query subject.

1. In the **Project Viewer** pane, select **ORDER_HEADER** and **ORDER_DETAILS**, right-click one of the selected items, and then click **Merge in New Query Subject**.

 You are asked if you would like to recreate existing relationships.

2. Click **Yes**.

 You want all the relationships recreated because this is a fact query subject that connects to many dimensional query subjects. You did not want to recreate relationships when creating aliases earlier, because you were specifically creating new relationships to avoid ambiguous query paths.

 By merging these two objects and maintaining relationships, the query subject will behave as a view and always generate the underlying join between the two query subjects. This will be examined in more detail later in the course when exploring SQL generation.

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3. Rename the new model query subject to **Sales Fact**.
4. Double-click **Sales Fact** to open its **Query Subject Definition** dialog box.
5. Delete the following query items:

 RETAILER_NAME
 RETAILER_NAME_MB
 ORDER_NUMBER1

 By deleting the retailer names, you are preventing authors from accessing the incorrect version of the retailer name and inadvertently taking descriptive information from a fact query subject.

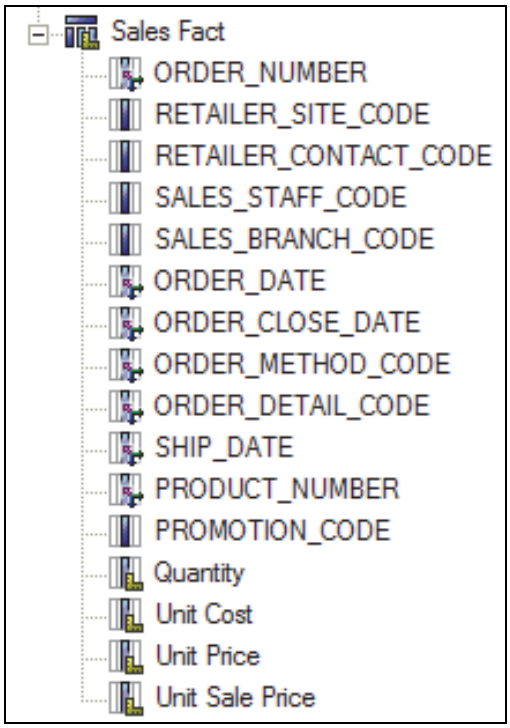
 ORDER_NUMBER1 is a redundant query item merged in from ORDER_DETAILS. You will use ORDER_NUMBER from ORDER_HEADER.

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6. Click **OK**, and then rename the measure query items as follows:
 - **Quantity**
 - **Unit Cost**
 - **Unit Price**
 - **Unit Sale Price**

 The results appear as follows:



 These are the query items that will eventually be used in the Presentation View which your authors will see.

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Task 2. Test "As View" behavior.

1. Test the **Quantity** query item, and then view the **Query Information** tab.

 The results appear as follows:

```
Cognos SQL
select
       Sales_Fact.Quantity  as  Quantity
 from
       (select
              ORDER_DETAILS.QUANTITY  as  Quantity
        from
              GOSALES.GOSALES.gosales.ORDER_HEADER ORDER_HEADER,
              GOSALES.GOSALES.gosales.ORDER_DETAILS ORDER_DETAILS
       where
              (ORDER_HEADER.ORDER_NUMBER = ORDER_DETAILS.ORDER_NUMBER)
       ) Sales_Fact
```

 Although you selected an item only associated with ORDER_DETAILS, a join with ORDER_HEADER is honored as seen in the where clause. The two underlying query subjects are now treated as one.

2. Click **Close**.

 You will now quickly test the behavior of a merged query with no relationships attached.

3. In the **Project Viewer** pane, select **ORDER_HEADER** and **ORDER_DETAILS**, right-click one of the selected items, and then click **Merge in New Query Subject**.

 You are asked if you would like to recreate existing relationships.

4. Click **No**.

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5. Expand **ORDER_HEADER_ORDER_DETAILS**, test **QUANTITY**, and then click the **Query Information** tab.

 The results appear as follows:

```
Cognos SQL
select
       ORDER_DETAILS.QUANTITY  as  QUANTITY
 from
       GOSALES.GOSALES.gosales.ORDER_DETAILS ORDER_DETAILS
```

 There is no join with ORDER_HEADER. This new query subject is simply acting as a container for the two underlying query subjects. Since you only queried an item from ORDER_DETAILS, the SQL is minimized and only requests information from that one table in the database.

6. Click **Close**, and then click **Undo** on the toolbar to remove the new query subject.

Task 3. Organize gosales namespace and reduce model clutter.

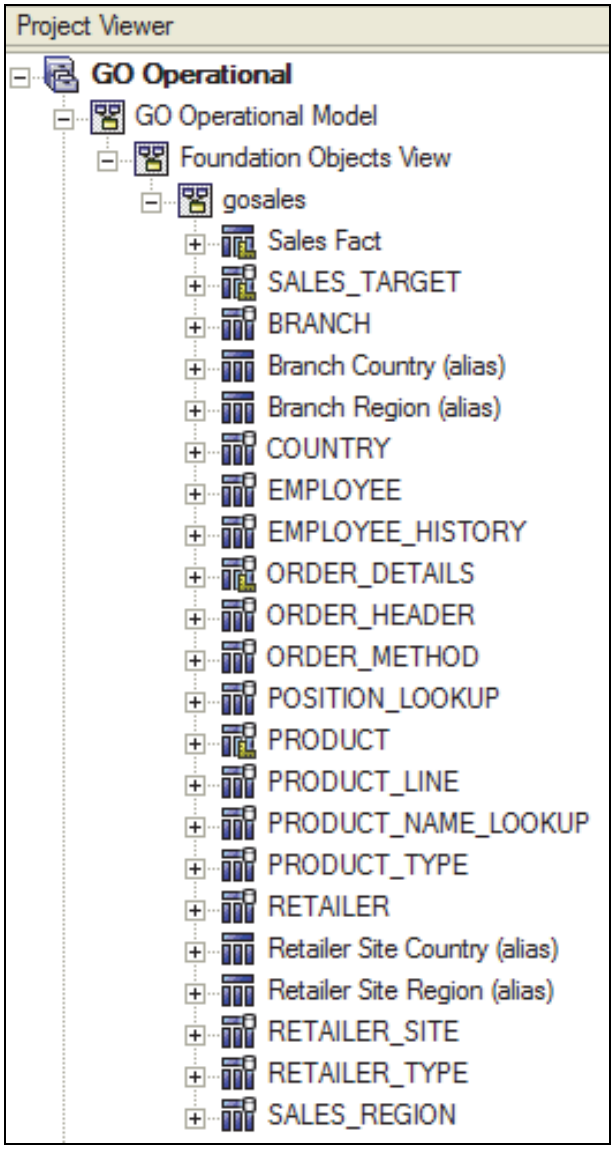
As a convention, you will sort your project objects alphabetically, but place all facts before all dimensions.

1. In the **Project Viewer**, right-click the **gosales** namespace, and then click **Reorder**.
2. Ensure **Ascending** is selected, and then click **OK**.

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3. Drag **Sales Fact** to the top in the **gosales** namespace, and then drag **SALES_TARGET** below **Sales Fact**.

 The results appear as follows:



Original data source query subjects that have been replaced by model query subjects (in order to prevent reporting traps) will be placed in a separate folder and non-required relationships will be deleted in order to reduce model clutter.

You will do this now for ORDER_HEADER and ORDER_DETAILS.

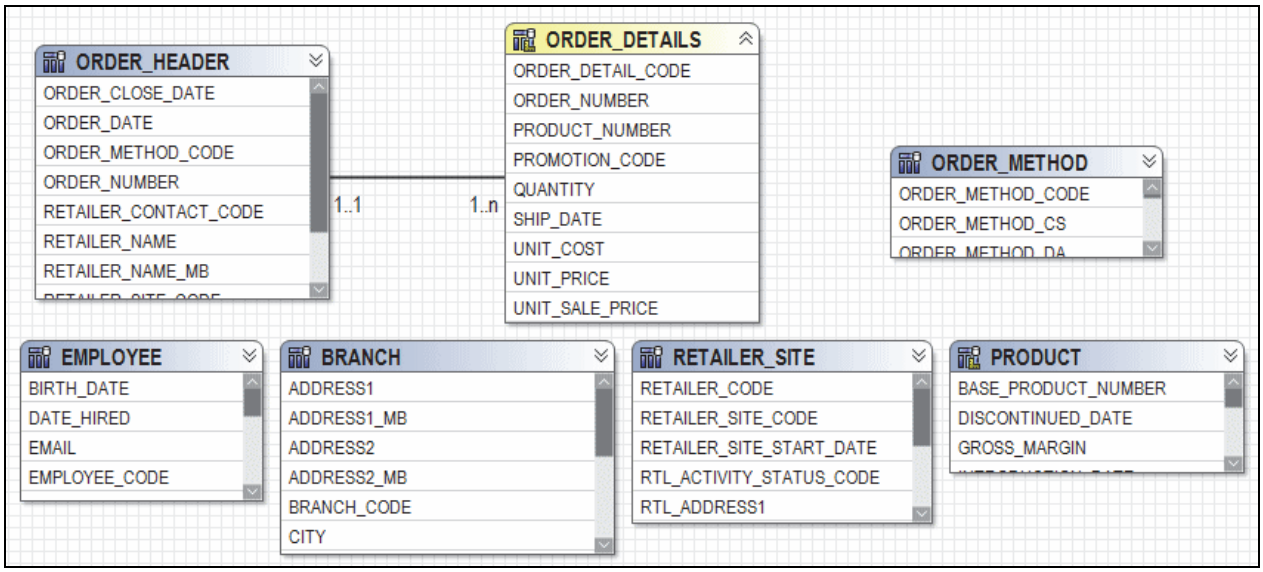
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4. Right click the **gosales** namespace and choose **Create** > **Folder**, and name it **Original Sales Objects**, and then click **Next**.
5. Expand **Foundation Objects View** > **gosales**, select the **X** next to **ORDER_DETAILS** and **ORDER_HEADER**.

 They will change to green checks.
6. Click **Finish**.
7. Expand **Original Sales Objects**, select **ORDER_HEADER** and **ORDER_DETAILS**, right-click one of the selected items, and then click **Launch Context Explorer**.
8. Click **Show Related Objects**, and then delete all relationships except the one between **ORDER_HEADER** and **ORDER_DETAILS**.

 The results appear as follows:



9. Close the **Context Explorer**.
10. Save your project.

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Task 4. Test your new virtual star schema query subjects (optional).

Recall the Ambiguous Relationships demo in the Identify Reporting Issues module. An author was asked to create a query with COUNTRY_EN and QUANTITY, but there was more than one path between the data source query objects and so there was potential for unexpected results.

Now authors must explicitly take the country name from either Retailer Country (down one path) or Branch Country (down another path), depending on whether they want the countries of the clients (retailers) or of the sales offices (branches). The results are always expected and predictable.

1. Select and test the following query items with **Auto Sum** enabled:

Query Subject	Query Item
Retailer Site Country (alias)	**Retailer Site Country**
Sales Fact	**Quantity**

The goal is to report on the number of units sold to each retailer's country.

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2. Click the **Query Information** tab.

 The results appear as follows:

Cognos SQL

```
select
       Retailer_Site_Country__alias_.Retailer_Site_Country  as  Retailer_Site_Country,
       XSUM(Sales_Fact.Quantity  for Retailer_Site_Country__alias_.Retailer_Site_Country )  as
 from
       (select
              COUNTRY.COUNTRY_CODE  as  Retailer_Site_Country_Code,
              COUNTRY.COUNTRY_EN  as  Retailer_Site_Country
        from
              GOSALES.GOSALES.gosales.COUNTRY COUNTRY
       ) Retailer_Site_Country__alias_,
       (select
              ORDER_HEADER.RETAILER_SITE_CODE  as  RETAILER_SITE_CODE,
              ORDER_DETAILS.QUANTITY  as  Quantity
        from
              GOSALES.GOSALES.gosales.ORDER_HEADER ORDER_HEADER,
              GOSALES.GOSALES.gosales.ORDER_DETAILS ORDER_DETAILS
        where
              (ORDER_HEADER.ORDER_NUMBER = ORDER_DETAILS.ORDER_NUMBER)
       ) Sales_Fact,
       GOSALES.GOSALES.gosalesrt.RETAILER_SITE RETAILER_SITE
 where
       (Retailer_Site_Country__alias_.Retailer_Site_Country_Code = RETAILER_SITE.RTL_COUNTRY_CO
       (RETAILER_SITE.RETAILER_SITE_CODE = Sales_Fact.RETAILER_SITE_CODE)
 group by
       Retailer_Site_Country__alias_.Retailer_Site_Country
```

 Notice the final where clause. The query takes the path you expected, Retailer Country (alias) to RETAILER_SITE to Sales Fact. This query works because the model has no alternative query paths. You have removed any ambiguity. The same concept would apply if you tested Branch Country (alias) and Sales Fact.

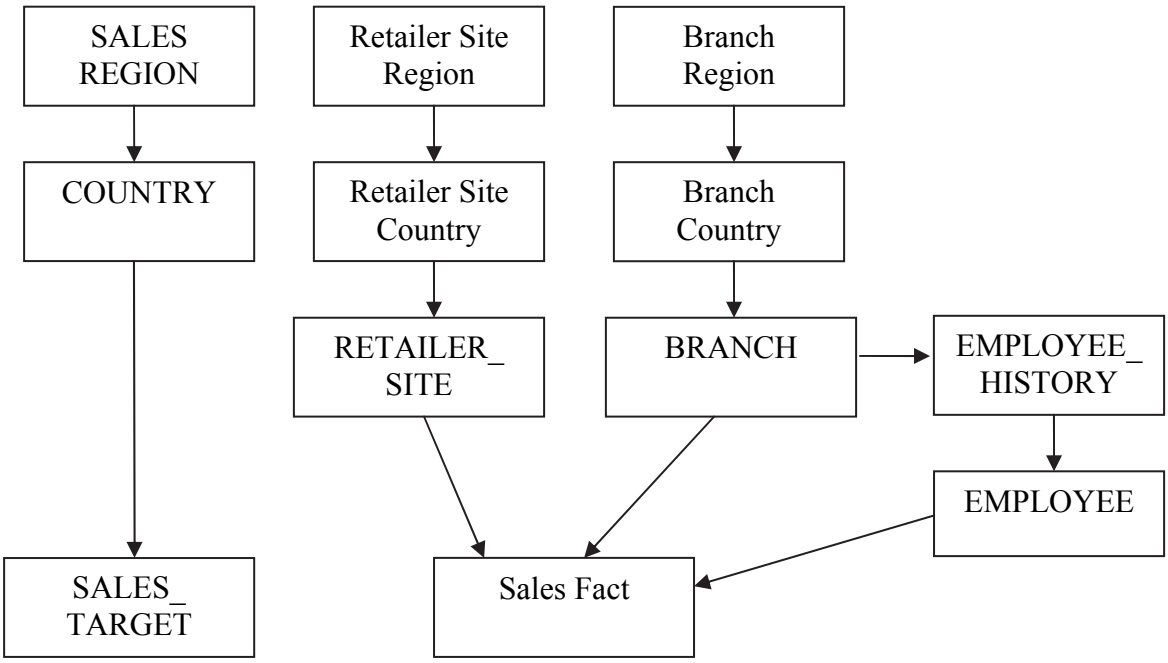
3. Click **Close**, save the project, and leave Framework Manager open for the Workshop.

Results:
To remove ambiguity that may occur with the ORDER_HEADER data source query subject, you merged ORDER_HEADER with ORDER_DETAILS. You then organized your model and reduced clutter and tested your new alias query subjects with the new Sales Fact query subject to ensure ambiguity has been removed.

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Workshop 1: Create Staff-Related Model Query Subjects

In the last two demos, you wanted report authors to avoid accidentally choosing the wrong path between SALES_REGION/COUNTRY and ORDER_HEADER/ORDER_DETAILS, so you created two aliases of SALES_REGION and COUNTRY, one for retailer sites and one for branches. You also, merged ORDER_HEADER and ORDER_DETAILS into a Sales Fact model query subject.



However, BRANCH links to Sales Fact in two paths; directly, as well as through EMPLOYEE_HISTORY and EMPLOYEE.

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Create a third alias for SALES_REGION and COUNTRY as follows:

- **Staff Region (alias)**
 - **Staff Region Code** (from SALES_REGION_CODE)
 - **Staff Region** (from SALES_REGION_EN)
- **Staff Country (alias)**
 - **Staff Country Code** (from COUNTRY _CODE)
 - **Staff Region Code** (from SALES_REGION_CODE)
 - **Staff Country** (from COUNTRY_EN)

Create a relationship between Staff Region (alias) and Staff Country (alias).

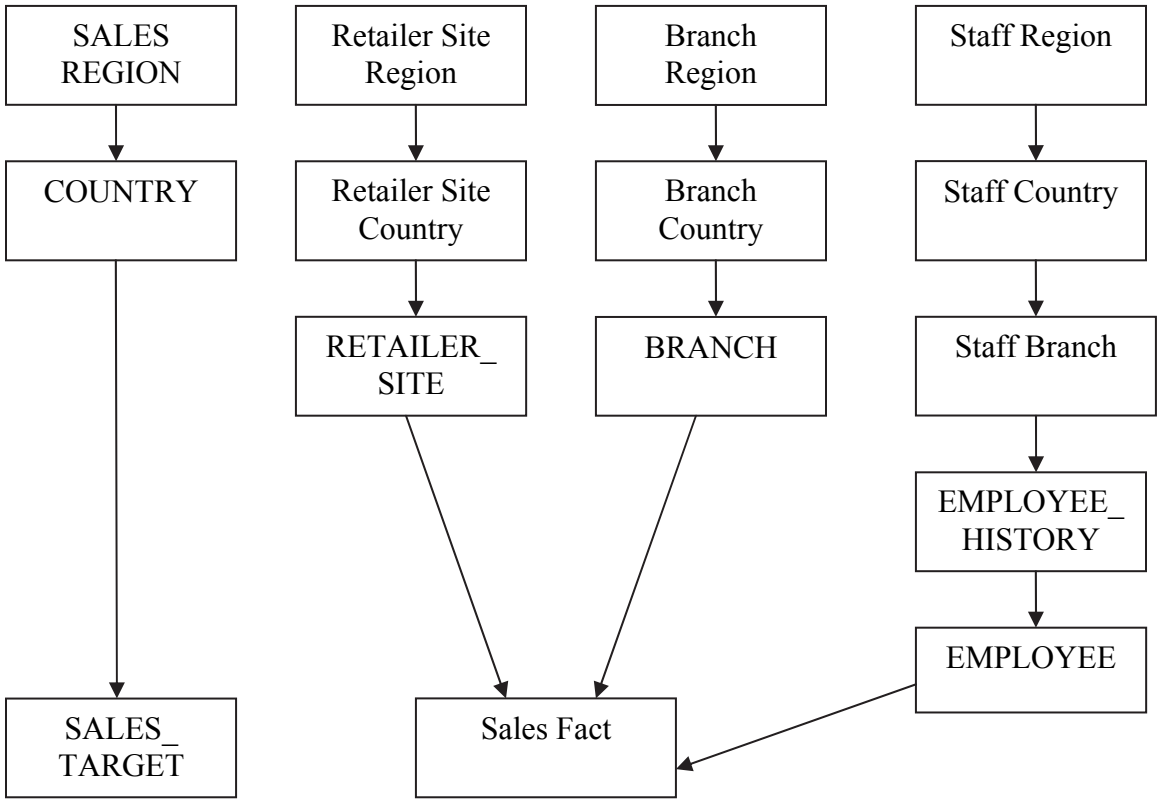
You also need a relationship from Staff Country (alias) to BRANCH, but Branch Country (alias) already has a join to BRANCH. To avoid ambiguity, you first need to create an alias for BRANCH.

- Create a new model query subject called **Staff Branch (alias)**, with the following query items (taken from BRANCH and renamed):
 - Staff Country Code
 - Staff Branch Code
 - Staff Address1
 - Staff Address2
 - Staff City
 - Staff Prov/State
 - Staff Postal Zone
- Create a relationship between Staff Country (alias) (**Staff Country Code, 1..1**) and Staff Branch (alias) (**Staff Country Code, 1..n**).

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- Create a relationship between Staff Branch (alias) (**Staff Branch Code, 1..1**) and EMPLOYEE_HISTORY **(BRANCH_CODE, 1..n)**.
- Delete the relationship between the original **BRANCH** and **EMPLOYEE_HISTORY**.

The results should look as follows:



Remember to manually sort your new objects alphabetically and arrange your diagram to show the new staff query path from region through to EMPLOYEE_HISTORY.

For more detailed information outlined as tasks, see the Task Table on the next page.

For the workshop results, see the Workshop Results section that follows the Task Table.

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Workshop 1: Task Table

Task	Where to Work	Hints
1. Create Staff Region (alias) and Staff Country (alias).	Project Viewer	• Make copies of Branch Region (alias) and Branch Country (alias) and rename objects as follows: Staff Region (alias) containing Staff Region Code and Staff Region Staff Country (alias) containing Staff Country Code and Staff Region Code and Staff Country **Tip:** Select original objects to copy and paste. This will also copy the relationship between the new objects.
2. Create Staff Branch (alias) model query subject.	Project Viewer, Query Subject Definition dialog box	• Create a new model query subject called Staff Branch (alias) in the gosales namespace. • Contents (after renaming), from BRANCH: Staff Country Code Staff Branch Code Staff Address1 Staff Address2 Staff City Staff Prov/State Staff Postal Zone

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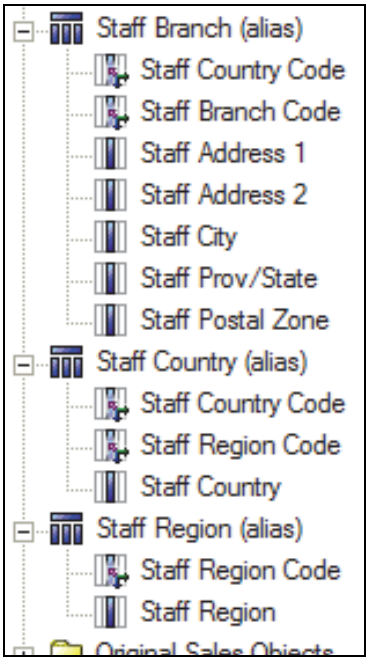
Task	Where to Work	Hints
3. Create branch relationships.	Project Viewer, Relationship Definition dialog box	• Do not replicate underlying relationships. • Staff Country (alias) (1..1) to Staff Branch (alias) (1..n) on Staff Country Code • Staff Branch (alias) (1..1) to EMPLOYEE_HISTORY (1..n) on Staff Branch Code = BRANCH_CODE
4. Delete unwanted relationship.	Project Viewer, Context Explorer	• Delete the relationship between the original BRANCH and EMPLOYEE_HISTORY, and between BRANCH and Staff Country (alias).
5. Organize your project.	Project Viewer, Diagram	• Organize the new model query subjects manually so that they are listed alphabetically in the gosales namespace. • Arrange your diagram to clearly show the new path created for staff information. • Save and leave the project open for the next workshop.

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Workshop 1: Workshop Results

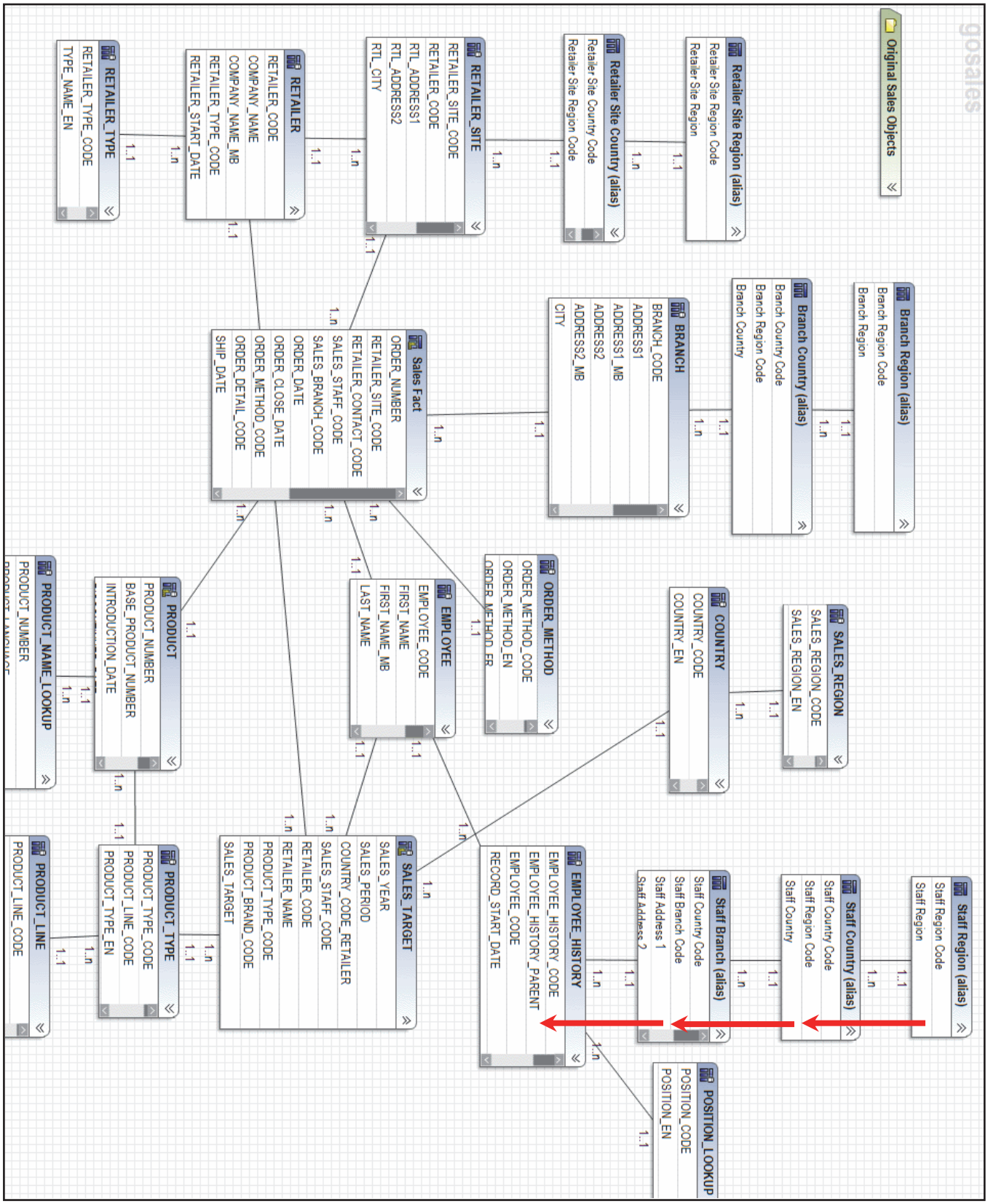
Your Foundation Objects View should include the new objects shown below:



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Workshop 1: Workshop Results

Your Diagram should be organized to show the new staff query path.



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Workshop 2: Merge Query Subjects to Remove Ambiguity

Based on the modeling in the freehand exercise, it was determined that both PRODUCT_TYPE and RETAILER had the potential to be ambiguous query subjects.

To remove their ambiguity, you will merge them with other query subjects.

- PRODUCT_TYPE will be merged with PRODUCT, say yes to recreating relationships, rename the new query subject to Product Type & Product, and remove any redundant query items
 - Move original query subjects into a new folder called Original Product Objects and delete all relationships to them except the one between each other
- RETAILER will be merged with RETAILER_SITE, say yes to recreating relationships, rename the new query subject to Retailer & Retailer Site, and remove any redundant query items
 - Move original query subjects into a new folder called Original Retailer Objects and delete all relationships to them except the one between each other

Arrange the new model query subjects alphabetically.

For more detailed information outlined as tasks, see the Task Table on the next page.

For the workshop results, see the Workshop Results section that follows the Task Table.

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Workshop 2: Task Table

Task	Where to Work	Hints
1. Merge product query subjects.	Project Viewer, Diagram or Context Explorer	• Merge PRODUCT_TYPE and PRODUCT and say yes to recreating relationships • Rename to Product Type & Product • Delete PRODUCT_TYPE_CODE1 • Move PRODUCT_TYPE and PRODUCT to a new folder called Original Product Objects in the Foundation Objects View/gosales • Delete all relationships to PRODUCT_TYPE and PRODUCT except the relationship between PRODUCT_TYPE and PRODUCT • Arrange new model query subject alphabetically

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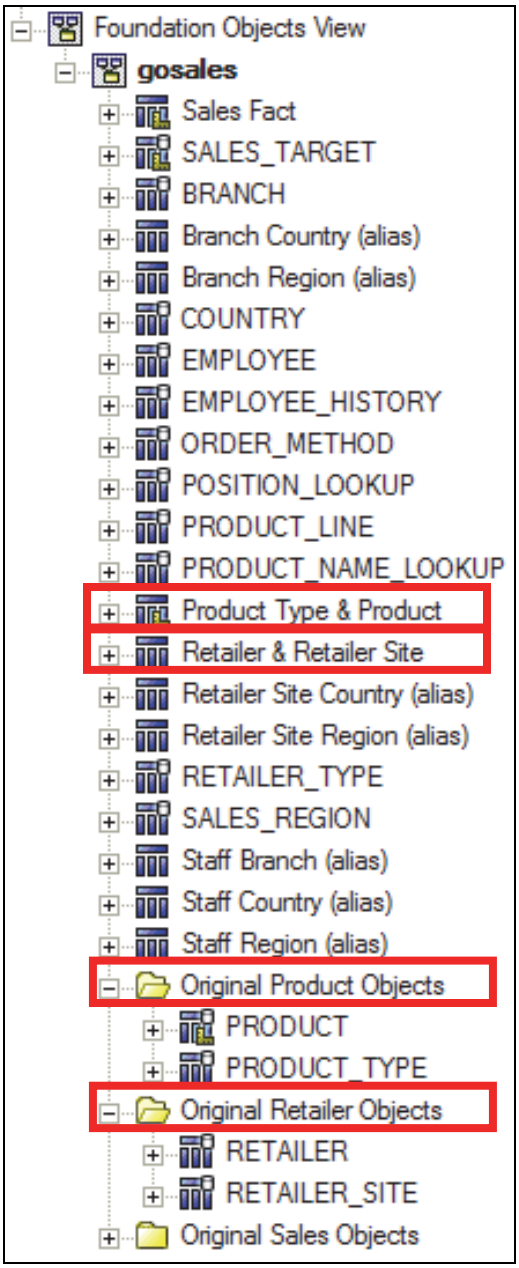
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Task	Where to Work	Hints
2. Merge retailer query subjects.	Project Viewer, Diagram or Context Explorer	• Merge RETAILER and RETAILER_SITE and say yes to recreating relationships • Rename to Retailer & Retailer Site • Delete RETAILER_CODE1 • Move RETAILER and RETAILER_SITE to a new folder called Original Retailer Objects in the Foundation Objects View/gosales • Delete all relationships to RETAILER and RETAILER_SITE except the relationship between RETAILER and RETAILER_SITE • Manually arrange new model query subject alphabetically • Save and close the project

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Workshop 2: Workshop Results

Your Foundation Objects View should include the new objects and folders shown below:



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Business Analytics

Summary

- You should now be able to:
 - identify the advantages of modeling metadata as a star schema
 - model in layers
 - create aliases to avoid ambiguous joins
 - merge query subjects to create as view behavior

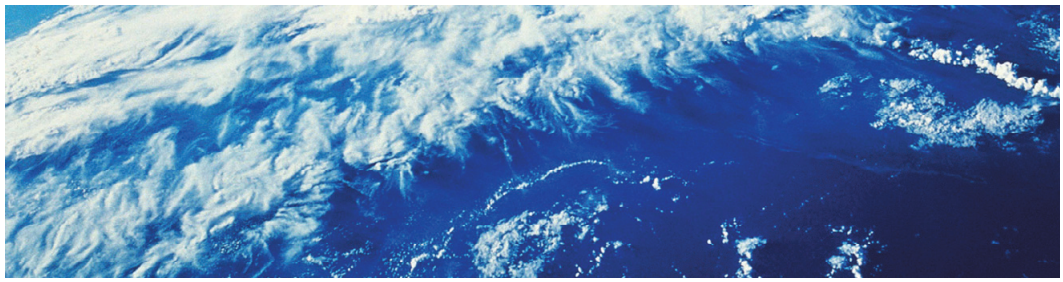
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Model for Predictable Results: Consolidate Metadata

IBM Cognos BI



Business Analytics

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Business Analytics

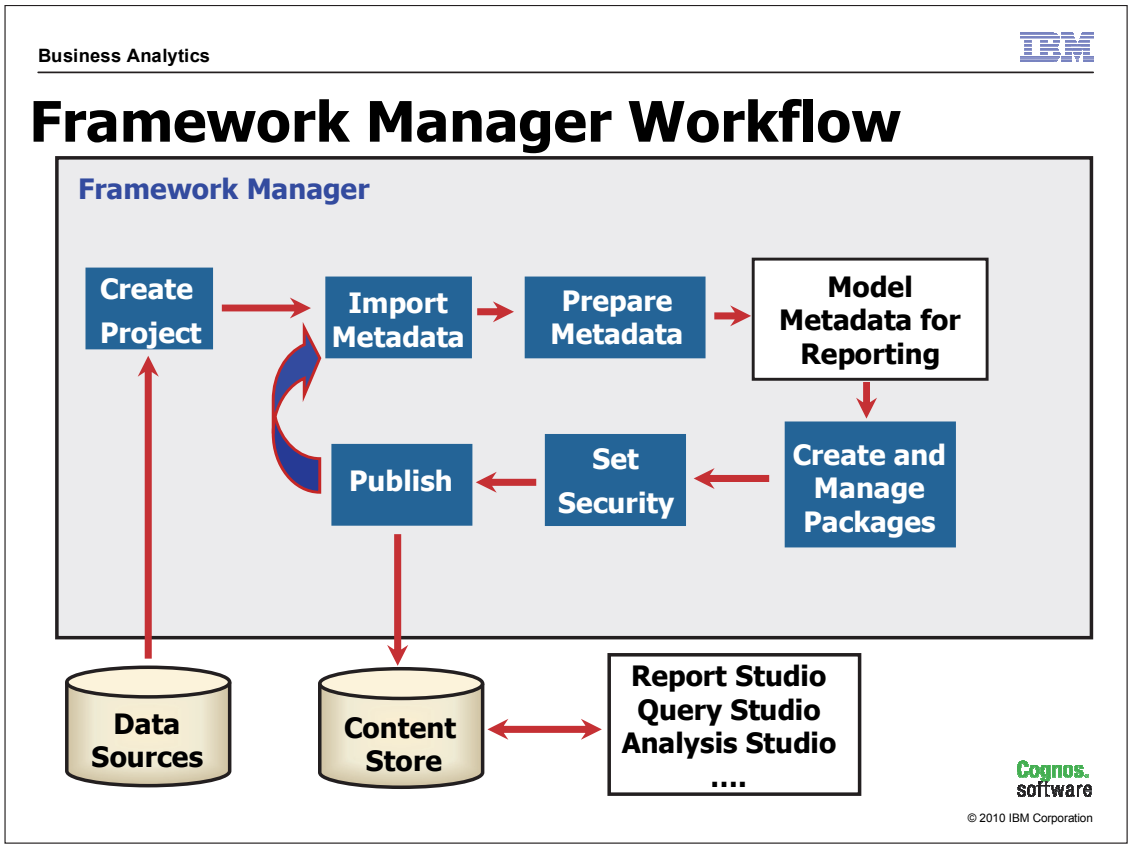
Objectives

- At the end of this module, you should be able to:
 - create virtual facts to simplify writing queries
 - create virtual dimensions to resolve fact-to-fact joins
 - create a consolidated modeling layer for presentation purposes
 - consolidate snowflake dimensions with model query subjects
 - simplify facts by hiding unnecessary codes

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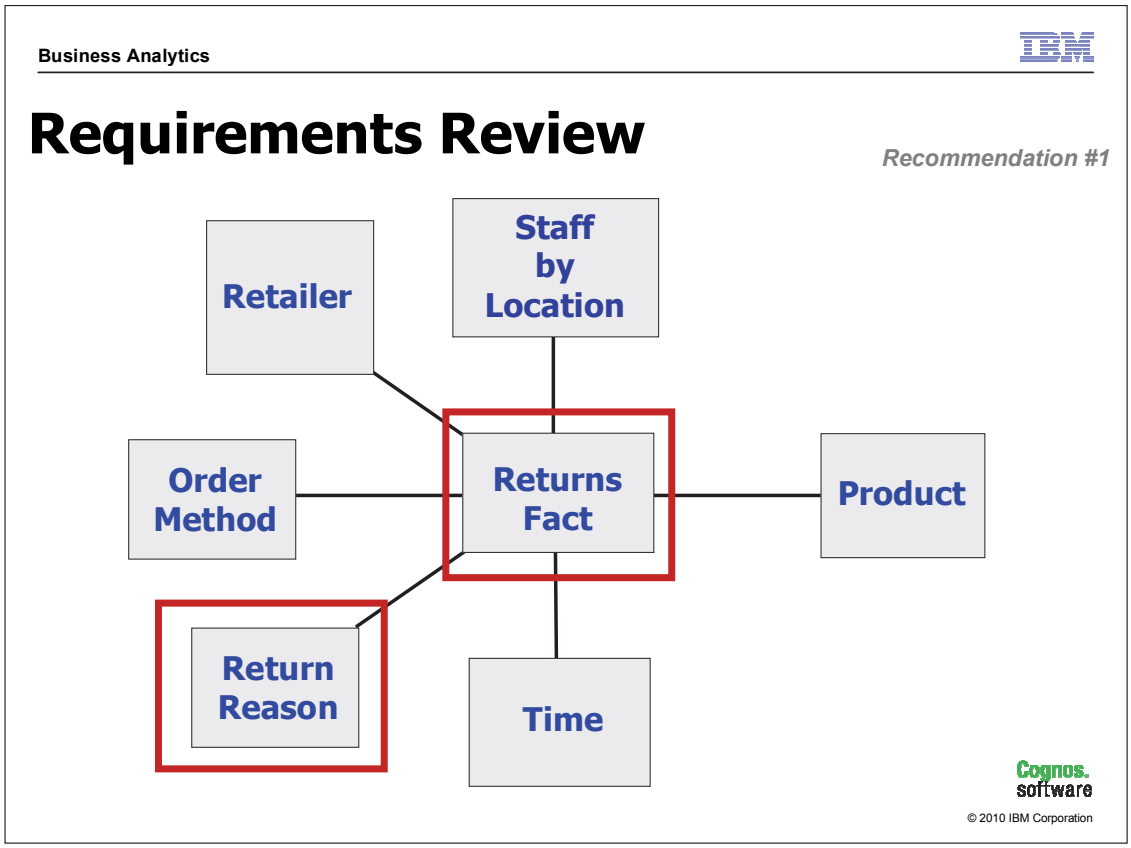
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This module deals with creating a Consolidation View in which model query subjects are used to create a layer of consolidated metadata to be presented to authors. This layer will insulate reports from changes to the underlying data source.

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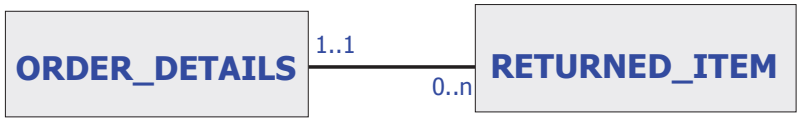
In the next demo, you will import returns metadata and then model accordingly to meet the reporting requirements - the ability to report on returns against all the dimensions listed.

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Business Analytics

Examine Returns Data

- In the data source returns are related to order details, and not the required dimensions for reporting



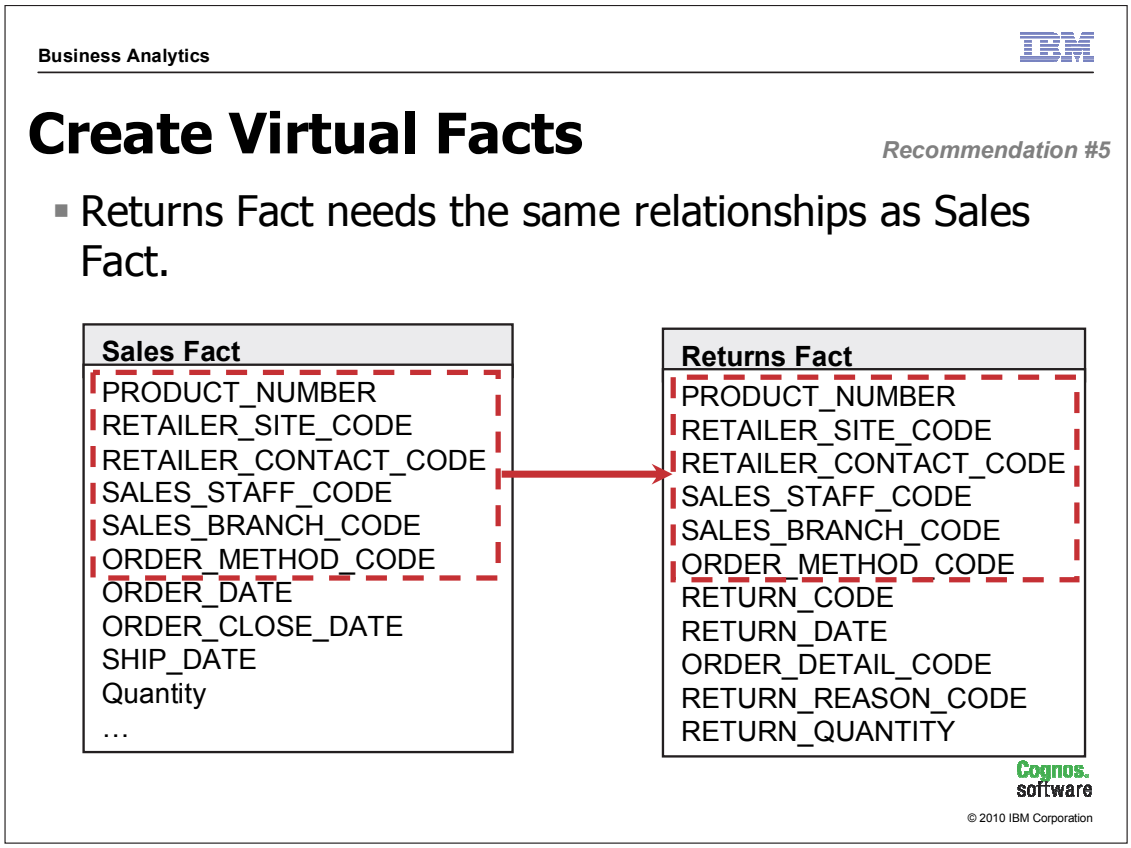
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The nature of the data does not currently let you directly report returns by staff, order method, or product.

You will need to use modeling techniques to make returns fact data appear directly related to the required dimensions.

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Because returns are so closely related to orders, they should have the same relationships to dimensions as orders. This is to provide authors with the ability to write logical reports, for such things as "which products were returned", without having to include order information to get results for returns.

You can create a model query subject to include all the keys required to create relationships between Returns Fact and all the required dimensions. This makes the new model query subject appear like a virtual fact table as seen in a star schema data warehouse. Keys will be hidden so that only facts are visible to authors.

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Demo 1: Create a Virtual Fact

Purpose:
Report authors would like to create reports on returns (such as how many returns are on a particular product) without having to explicitly include Sales Fact to get the correct results. This can be done through a Returns Fact, which will also fit the goal of modeling as a virtual star schema. You can create relationships between this fact and other dimensional model query subjects.

Component: **Framework Manager**

Project: **GO Operational**

Task 1. Import returns metadata.

1. In **Framework Manager**, close any projects that may be open, and then open the **GO Operational** model located at **C:\Edcognos\B5152\CBIFM-Start Files\Module 8\GO Operational**.
2. If prompted, log in as User ID **admin**, and Password **Education1!**.
3. In the **Project Viewer** pane, right-click the **gosales** namespace, and then click **Run Metadata Wizard**.
4. Ensure that **Data Sources** is selected, and then click **Next**.
5. Ensure **GOSALES** is selected, and then click **Next**.
6. In the list of objects, expand **GOSALES**>**Tables**, and then select **RETURNED_ITEM** and **RETURN_REASON**.
7. Click **Next**.
8. On the **Generate Relationships** page, select **Both**.

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9. Click **Import**, and then click **Finish**.
10. Expand the two new data source query subjects to view their contents.

 RETURNED_ITEM will be used to create Returns Fact and RETURN_REASON will be used as a dimension to provide context to returns.

 You are now ready to create a new virtual fact by combining query items from several data source query subjects into one model query subject.

Task 2. Build the Returns Fact.

1. In the **gosales** namespace, create a new model query subject called **Returns Fact**, and then click **OK**.
2. In the **Query Subject Definition**, expand **Foundation Objects View**> **gosales**, and **RETURNED_ITEM**, and then add the following query items to the definition:

Query Subject	Query Item
RETURNED_ITEM	**RETURN_CODE** **RETURN_DATE** **ORDER_DETAIL_CODE** **RETURN_REASON_CODE**
ORDER_HEADER	**RETAILER_SITE_CODE** **SALES_STAFF_CODE** **SALES_BRANCH_CODE** **ORDER_METHOD_CODE**
ORDER_DETAILS	**PRODUCT_NUMBER**
RETURNED_ITEM	**RETURN_QUANTITY**

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3. Click **OK**, expand **Returns Fact**, and then rename **RETURN_QUANTITY** to **Return Quantity**.
4. Drag **Returns Fact** to just below **SALES_TARGET**, and then drag **RETURN_REASON** below **RETAILER_TYPE**.

 You now have three query subjects for facts (Sales Fact, SALES_TARGET, and Returns Fact), followed by all the query subjects for dimensions.
5. Drag **RETURNED_ITEM** to the **Original Sales Objects** folder, and then rename the folder to **Original Sales & Returns Objects**.

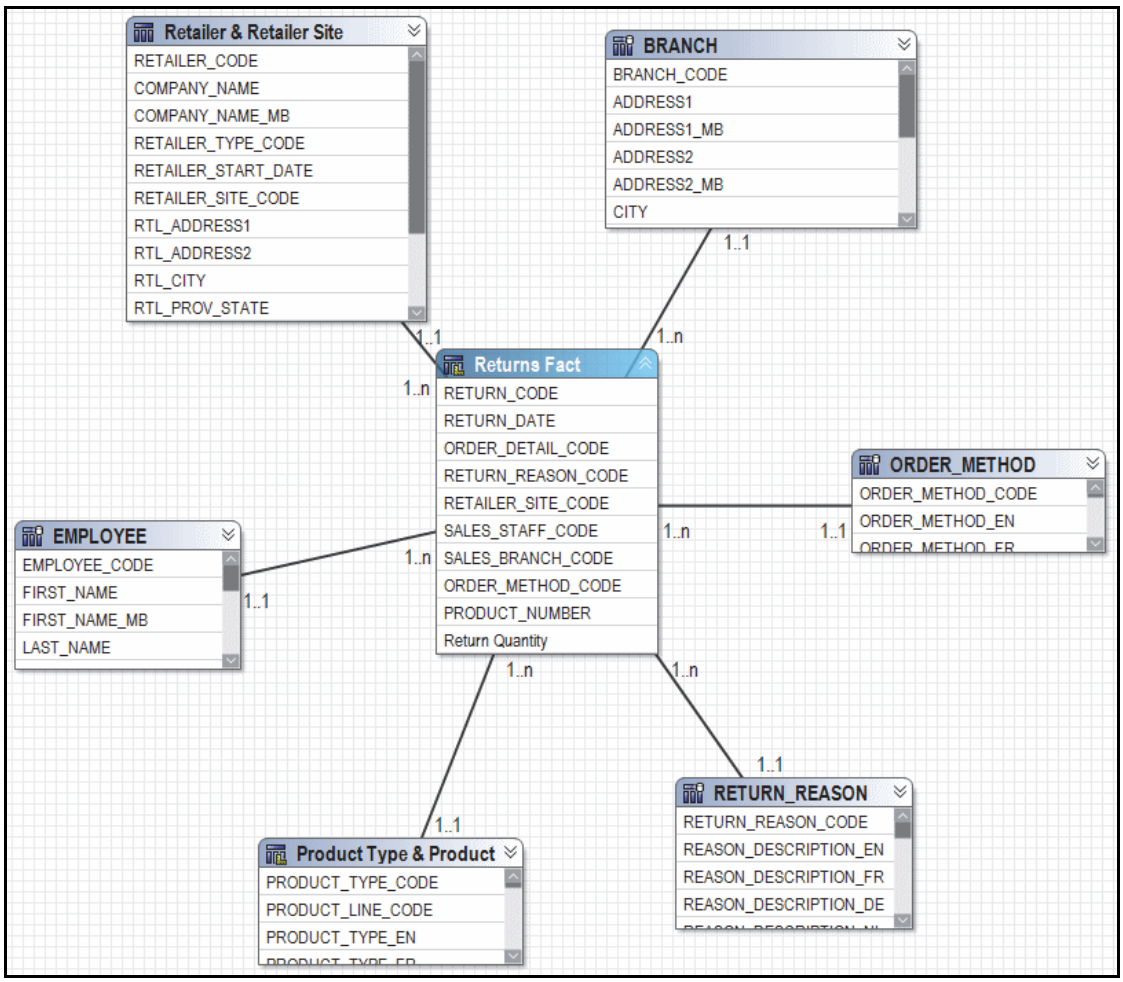
Task 3. Build relationships.

1. Create the following relationships, clicking **No** if asked to replicate the existing underlying relationships:
 - **RETURN_REASON** (RETURN_REASON_CODE, 1..1) to **Returns Fact** (RETURN_REASON_CODE, 1..n)
 - **ORDER_METHOD** (ORDER_METHOD_CODE, 1..1) to **Returns Fact** (ORDER_METHOD_CODE, 1..n)
 - **Product Type & Product** (PRODUCT_NUMBER, 1..1) to **Returns Fact** (PRODUCT_NUMBER, 1..n)
 - **EMPLOYEE** (EMPLOYEE_CODE, 1..1) to **Returns Fact** (SALES_STAFF_CODE, 1..n)
 - **Retailer & Retailer Site** (RETAILER_SITE_CODE, 1..1) to **Returns Fact** (RETAILER_SITE_CODE, 1..n)
 - **BRANCH** (BRANCH_CODE, 1..1) to **Returns Fact** (SALES_BRANCH_CODE, 1..n)

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2. Launch **Context Explorer** from **Returns Fact**, and then click **Show Related Objects**.
3. Click **Auto Layout**, ensure **Layout Style** is set to **Star**, and then click **Apply**.
4. Click **Close**.

 The results appear as follows:



 Notice that Returns Fact appears in a star schema in which the fact query subject is surrounded by its related dimensions.

 Note: The placement of the related dimensions may display in a different order.

5. Close **Context Explorer**.

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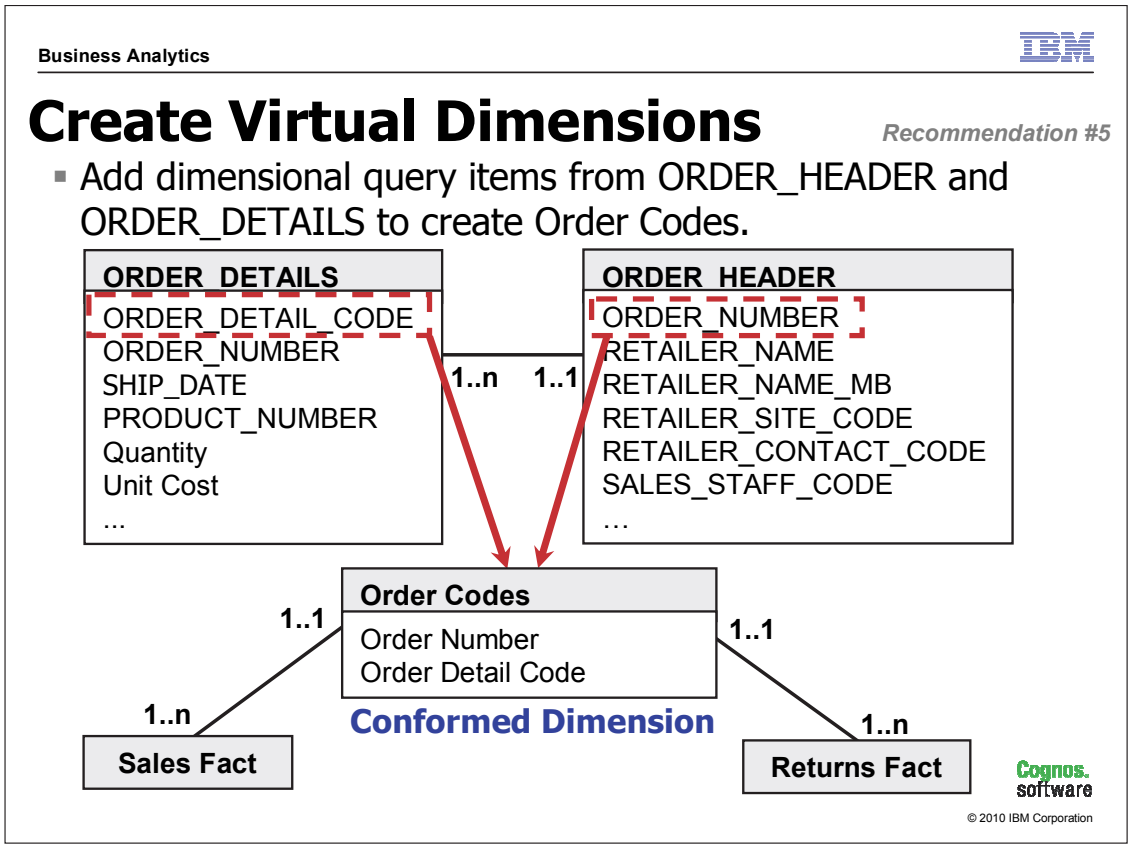
Task 4. Delete redundant relationship.

The original RETURNED_ITEM has a relationship to RETURN_REASON. This relationship is no longer required since the new Returns Fact model query subject now has a relationship to RETURN_REASON.

1. Right-click **RETURN_REASON**, and then click **Launch Context Explorer**.
2. Click **Show Related Objects**, and then delete the relationship between **RETURN_REASON** and **RETURN_ITEM**.
3. Close **Context Explorer**, and then save the project.

Results:
Report authors would like to create reports on returns (such as how many returns are for a particular product) without having to explicitly include Sales Fact to get the correct results. This was done by creating a Returns Fact, as well as relationships between this fact and other dimension model query subjects.

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Certain non-fact query items from fact tables can be placed in a model query subject to ensure that they are viewed as coming from a dimension by IBM Cognos.

For example, ORDER_NUMBER and ORDER_DETAIL_CODE are required for reporting purposes and are located in ORDER_HEADER and ORDER_DETAILS respectively. By placing these query items in a new model query subject called Order Codes, you create a query subject that acts like a virtual dimension table as seen in a star schema data warehouse. This ensures that the dimensional query items are not missing from the final model presentation.

In the underlying data source, the only way to query returns is through ORDER_DETAILS, which is a fact-to-fact join. Once created, the Order Codes query subject can act as a conformed dimension between Sales Fact and Returns Fact.

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Workshop 1: Create a Virtual Dimension

Analyzing the model design for flexibility, you see two reasons to create an Order Codes dimensional model query subject. First, it creates a virtual dimension that ensures that dimensional query items in ORDER_DETAILS and ORDER_HEADER are available in a dimension. Second, it allows report authors to stitch together queries on Sales Fact and Returns Fact in a single report, by using it as a conformed dimension.

Create this virtual dimension as follows:

- Create an Order Codes model query subject containing ORDER_DETAIL_CODE from ORDER_DETAILS and ORDER_NUMBER and from ORDER_HEADER.
- Form relationships from Order Codes to both Sales Fact and Returns Fact on the order detail code.
- Test the use of Order Codes as a conformed dimension. First, do a Test on Sales Fact>ORDER_NUMBER, Sales Fact>Quantity, and Returns Fact>Return Quantity. Then compare the results to a Test on Order Codes>Order Number, Sales Fact>Quantity, and Returns Fact>Return Quantity.
- Compare the SQL between the two tests.

For more detailed information outlined as tasks, see the Task Table on the next page.

To see the desired queries and model query subject contents, see the Workshop Results section that follows the Task Table.

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Workshop 1: Task Table

Task	Where to Work	Hints
1. Create a new model query subject.	Project Viewer	• Right-click gosales, Create > Query Subject • Name it Order Codes • Include ORDER_HEADER> ORDER_NUMBER and ORDER_DETAILS> ORDER_DETAIL_CODE. • Rename the query items to Order Number and Order Detail Code. • Drag Order Codes to just below EMPLOYEE_HISTORY to keep alphabetical order
2. Create relationships for Order Codes.	Project Viewer, Relationship Definition dialog box	• Reply **No** if asked to replicate the existing underlying relationships • Order Codes (Order Detail Code, 1..1) to Sales Fact (ORDER_DETAIL_CODE, 1..n) • Order Codes (Order Detail Code, 1..1) to Returns Fact (ORDER_DETAIL_CODE, 1..n) • Arrange Order Codes alphabetically, and then save the project

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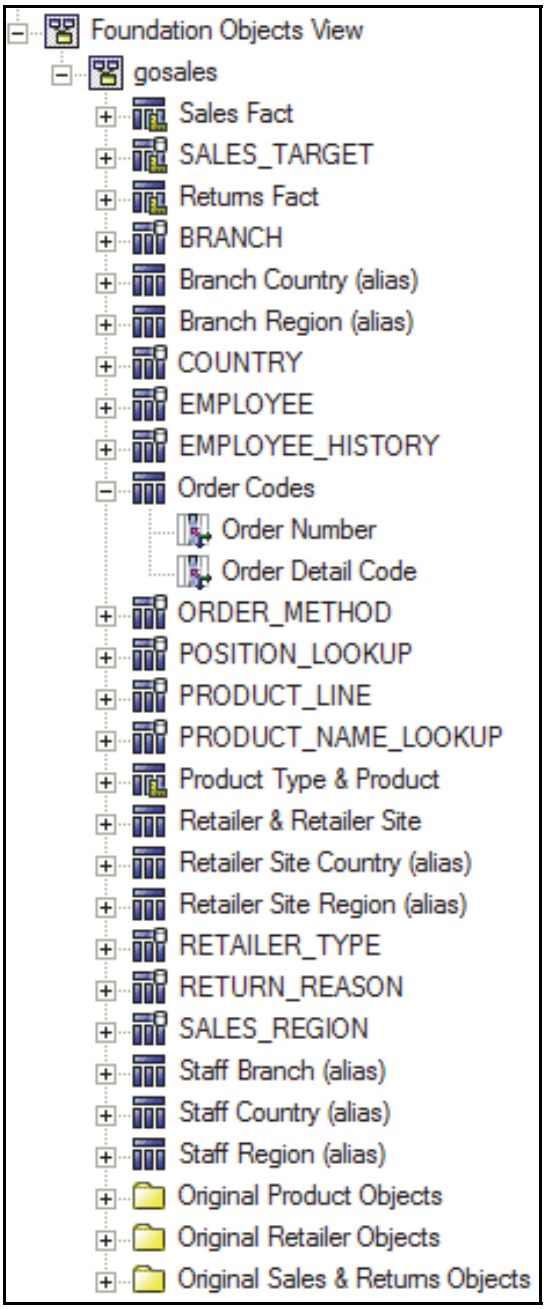
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3. Test Order Codes as a conformed dimension.	Project Viewer, Test Results	• Do a Test with Auto Sum enabled on Sales Fact >ORDER_NUMBER, Sales Fact >Quantity, and Returns Fact >Return Quantity • View the SQL • Do a Test with Auto Sum enabled on Order Codes>Order Number, Sales Fact >Quantity, and Returns Fact>Return Quantity • View the SQL

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Workshop 1: Workshop Results

Your Foundation Objects View should appear as shown below:



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Workshop 1: Workshop Results

SQL for the first test without Order Codes appears as shown below:

Cognos SQL

```
select
       D2.ORDER_NUMBER  as  ORDER_NUMBER,
       D2.Quantity  as  Quantity,
       D3.Return_Quantity  as  Return_Quantity
 from
       (select
              Sales_Fact.ORDER_NUMBER  as  ORDER_NUMBER,
              XSUM(Sales_Fact.Quantity  for Sales_Fact.ORDER_NUMBER )  as  Quantity
        from
              (select
                     ORDER_HEADER.ORDER_NUMBER  as  ORDER_NUMBER,
                     ORDER_DETAILS.QUANTITY  as  Quantity
               from
                     GOSALES.GOSALES.gosales.ORDER_HEADER ORDER_HEADER,
                     GOSALES.GOSALES.gosales.ORDER_DETAILS ORDER_DETAILS
               where
                     (ORDER_HEADER.ORDER_NUMBER = ORDER_DETAILS.ORDER_NUMBER)
              ) Sales_Fact
        group by
              Sales_Fact.ORDER_NUMBER
       ) D2,
       (select distinct
              XSUM(Returns_Fact.Return_Quantity )  as  Return_Quantity
        from
              (select
                     RETURNED_ITEM.RETURN_QUANTITY  as  Return_Quantity
               from
                     GOSALES.GOSALES.gosales.RETURNED_ITEM RETURNED_ITEM,
                     GOSALES.GOSALES.gosales.ORDER_HEADER ORDER_HEADER,
                     GOSALES.GOSALES.gosales.ORDER_DETAILS ORDER_DETAILS
               where
                     (ORDER_DETAILS.ORDER_DETAIL_CODE = RETURNED_ITEM.ORDER_DETAIL_CODE) and
                     (ORDER_HEADER.ORDER_NUMBER = ORDER_DETAILS.ORDER_NUMBER)
              ) Returns_Fact
       ) D3
```

No stitch query is performed and Return Quantity returns only one overall value for each record.

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Workshop 1: Workshop Results

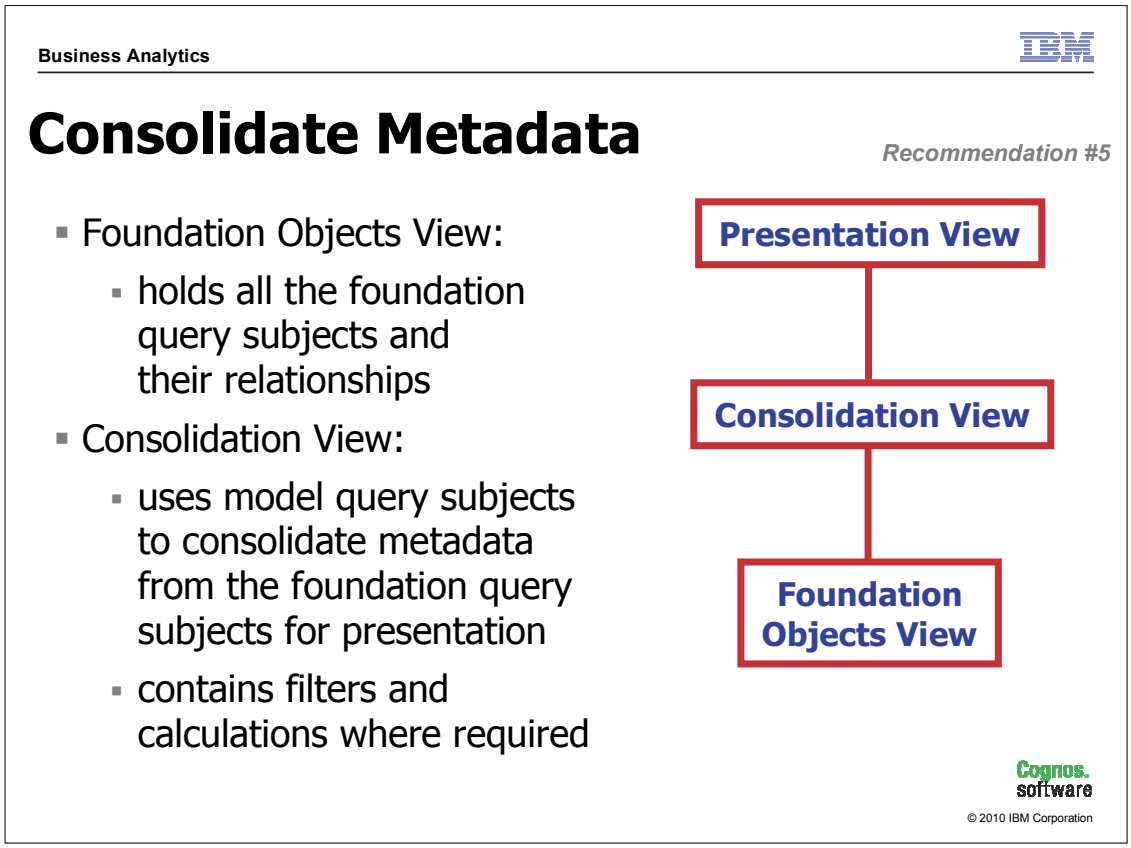
SQL for the second test with Order Codes appears as shown below:

Cognos SQL

```
select
       coalesce(D2.Order_Number,D3.Order_Number)  as  Order_Number,
       D2.Quantity  as  Quantity,
       D3.Return_Quantity  as  Return_Quantity
 from
       (select
              Order_Codes.Order_Number  as  Order_Number,
              XSUM(Sales_Fact.Quantity  for Order_Codes.Order_Number )  as  Quantity
        from
              (select
                     ORDER_DETAILS.ORDER_NUMBER  as  Order_Number,
                     ORDER_DETAILS.ORDER_DETAIL_CODE  as  Order_Detail_Code
               from
                     GOSALES.GOSALES.gosales.ORDER_DETAILS ORDER_DETAILS
              ) Order_Codes,
              (select
                     ORDER_DETAILS.ORDER_DETAIL_CODE  as  ORDER_DETAIL_CODE,
                     ORDER_DETAILS.QUANTITY  as  Quantity
               from
                     GOSALES.GOSALES.gosales.ORDER_HEADER ORDER_HEADER,
                     GOSALES.GOSALES.gosales.ORDER_DETAILS ORDER_DETAILS
               where
                      (ORDER_HEADER.ORDER_NUMBER = ORDER_DETAILS.ORDER_NUMBER)
              ) Sales_Fact
        where
              (Order_Codes.Order_Detail_Code = Sales_Fact.ORDER_DETAIL_CODE)
        group by
              Order_Codes.Order_Number
       ) D2
        full outer join
       (select
              Order_Codes.Order_Number  as  Order_Number,
              XSUM(Returns_Fact.Return_Quantity  for Order_Codes.Order_Number )  as  Return_Quantity
        from
              (select
                     ORDER_DETAILS.ORDER_NUMBER  as  Order_Number,
                     ORDER_DETAILS.ORDER_DETAIL_CODE  as  Order_Detail_Code
               from
                     GOSALES.GOSALES.gosales.ORDER_DETAILS ORDER_DETAILS
              ) Order_Codes,
              (select
```

The correct data is returned and the SQL shows a stitch query is performed to merge the two fact result sets together.

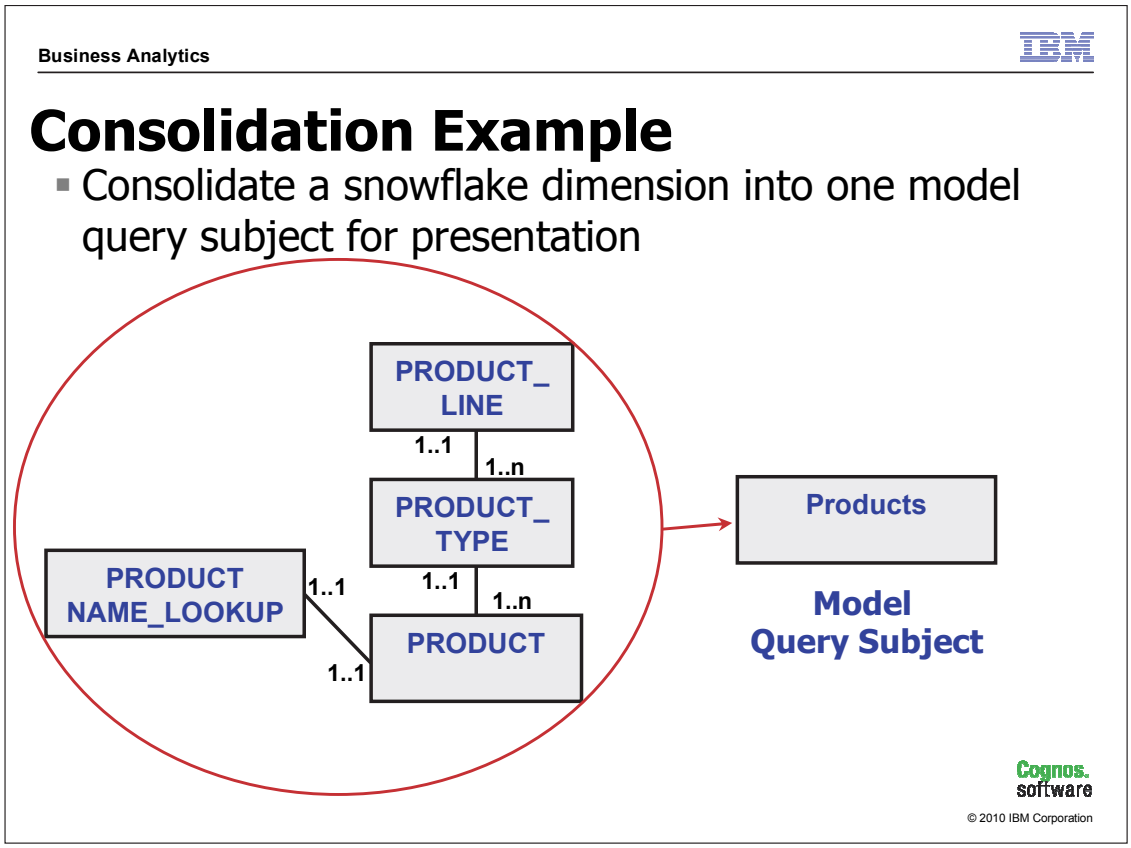
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The Consolidation View provides a layer of metadata that is separate from the foundation layer that contains all the relationships. To understand query paths, view the Foundation Objects View. To view how metadata will be presented to authors, view objects in the Consolidation View.

Consolidating the metadata involves tasks such as consolidating snowflake dimensions into one model query subject, or hiding codes found in fact query subjects, which are used for relationships.

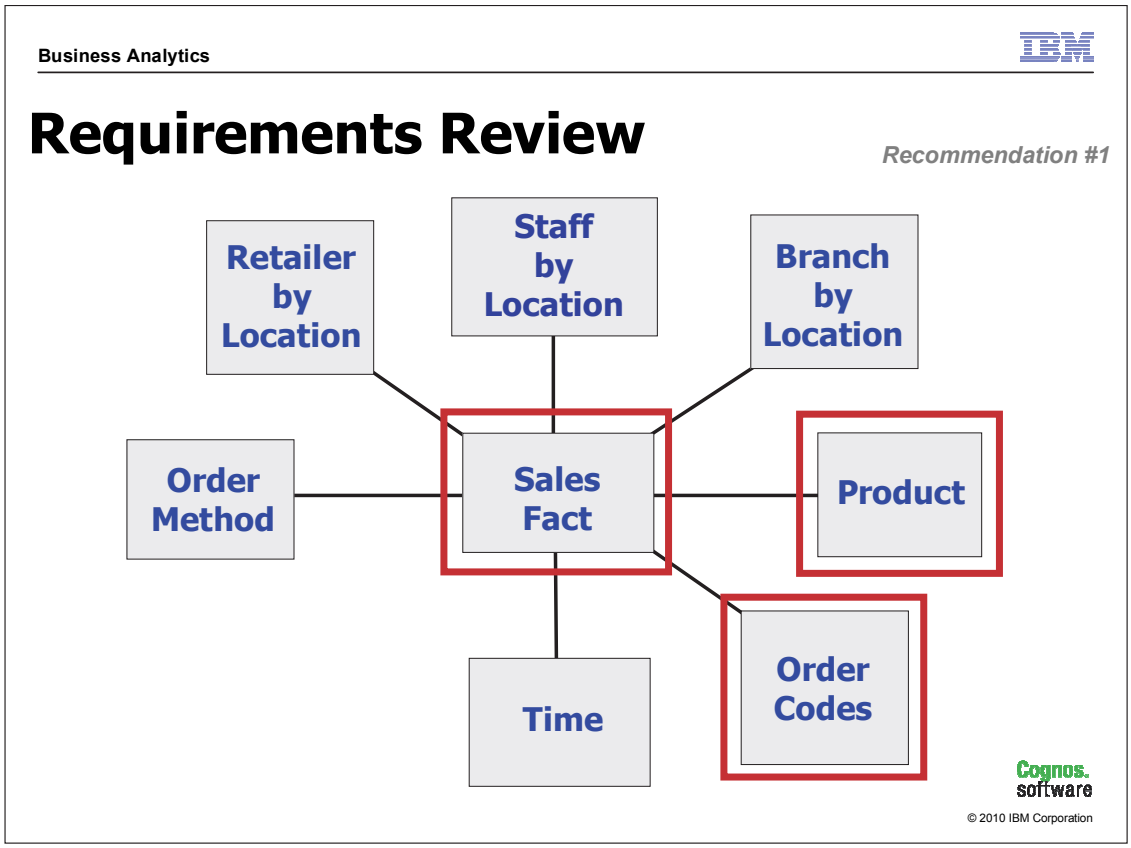
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An example of consolidating snowflake dimensions is placing query items from PRODUCT_LINE, PRODUCT_TYPE, PRODUCT, and PPRODUCT_NAME_LOOKUP into a model query subject called Products.

You can also use the Consolidation View to neatly present your facts. For example you can create a fact query subject that only contains measures. The codes used in relationships found in the underlying Foundation Objects View are simply not added and are therefore hidden from authors.

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In the next demo, you will consolidate product information into one model query subject to create a simplified Product dimension that will be presented to users.

You will also create a simplified model query subject for Sales Fact and the new conformed dimension you created in the last workshop called Order Codes. The Order Codes dimension is shared between Sales Fact and Returns Fact.

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Demo 2: Create the Consolidation View

Purpose:
To simplify the metadata view for authors, you will consolidate related query items into single query subjects. Authors would like access to codes but to reduce clutter you will organize them into query item folders.

Components: **Framework Manager, Business Insight Advanced**

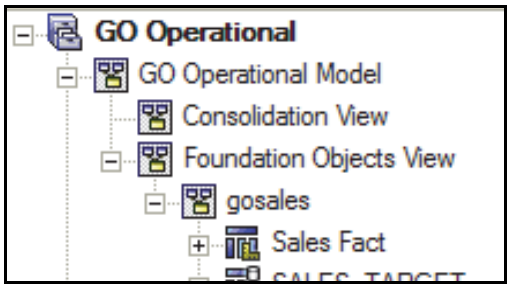
Project: **GO Operational**

Package: **Consolidation View Test**

Task 1. Create a new namespace to contain consolidated objects.

1. In the **Project Viewer** pane, in the **GO Operational Model** namespace, create a namespace called **Consolidation View**.
2. Drag the new namespace above **Foundation Objects View**.

 The results appear as follows:



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Task 2. Consolidate a snowflake dimension.

1. In the **Consolidation View** namespace, create a new model query subject called **Products**, and then click **OK**.
2. In the **Query Subject Definition**, expand **Foundation Objects View>gosales**, and then add the following query items to the definition:

Query Subject	Query Item
PRODUCT_LINE	**PRODUCT_LINE_CODE** **PRODUCT_LINE_EN**
Product Type & Product	**PRODUCT_TYPE_CODE** **PRODUCT_TYPE_EN**
PRODUCT_NAME_LOOKUP	**PRODUCT_NAME** **PRODUCT_DESCRIPTION**
Product Type & Product	**PRODUCT_NUMBER** **PRODUCT_IMAGE** **INTRODUCTION_DATE** **DISCONTINUED_DATE** **PRODUCTION_COST** **GROSS_MARGIN**

Note: Alternate methods to creating the model query subject include, selecting the individual query subjects or the query items within them and then merging them into a new model query subject.

3. Click **OK**, right-click **Products**, point to **Create**, and then click **Query Item Folder**.
4. Rename the folder to **Codes**.

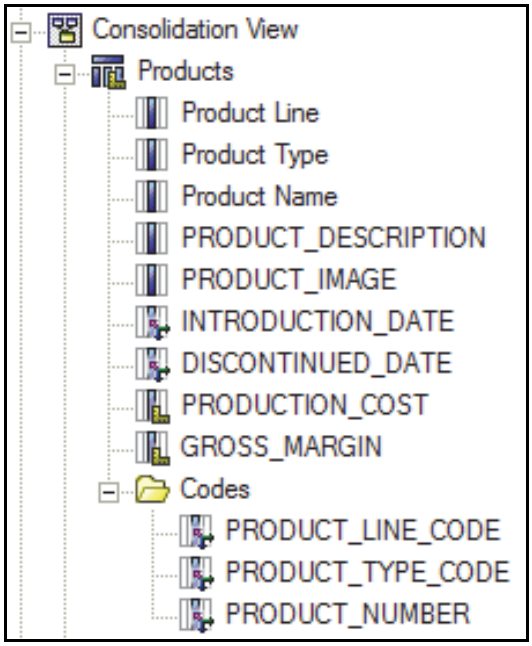
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5. Drag the following items into the folder:
 - **PRODUCT_LINE_CODE**
 - **PRODUCT_TYPE_CODE**
 - **PRODUCT_NUMBER**

 Authors still need these query items for activities like filtering and drill-through scenarios, so moving them into a subfolder is a good way to centralize such codes. It also organizes the metadata and makes the main dimensional query items easier to locate.

6. Rename the first three query items in **Products** as follows:
 - **Product Line**
 - **Product Type**
 - **Product Name**

 The results appear as follows:



 Normally, you would rename all items, but in order to save time, items will be renamed for you in the starting point project at the beginning of the next module.

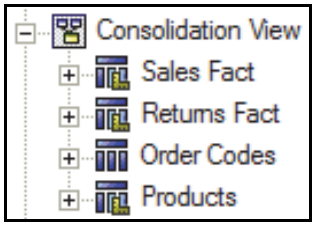
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Task 3. Create simplified query subjects for presentation.

1. In the **Consolidation View** namespace, create a new model query subject called **Sales Fact** containing the following query items from **Sales Fact** in the **Foundation Objects View**:
 - **Quantity**
 - **Unit Cost**
 - **Unit Price**
 - **Unit Sale Price**
2. Create a new model query subject called **Returns Fact** containing the following query item from **Returns Fact** in the **Foundation Objects View**:
 - **Return Quantity**
3. Create a new model query subject called **Order Codes** containing the following query items from **Order Codes** in the **Foundation Objects View**:
 - **Order Number**
 - **Order Detail Code**
4. In the **Consolidation View** namespace, drag **Products** below **Order Codes**.

 The results appear as follows:



5. Save the project.

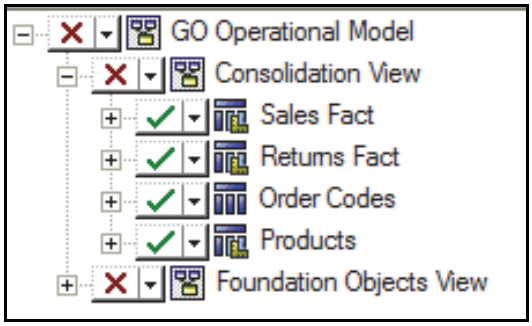
 You now have a consolidated view of the data that authors can report from without having to know the underlying relationships or table complexity.

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Task 4. Publish a package of the Consolidation View.

1. Right-click **Packages**, point to **Create**, and click **Package**.
2. Name the package **Consolidation View Test**, and then click **Next**.
3. Clear **GO Operational Model**, expand **Consolidation View**, and select the four model query subjects.

 The results appear as follows:



4. Click **Finish**, and then click **Yes** to open the **Publish Package** wizard.
5. Clear **Enable Model Versioning**, and then click **Next** twice.
6. Click **Publish**, and then click **Finish**.

 You are presented with an information list indicating that the objects you published refer to objects not included in the package. In order for the package to work, these items will be included in the package but hidden from the users.
7. Click **Close**.

Task 5. Test the Package.

1. Launch **IBM Cognos Connection**, log in, and open **Business Insight Advanced** selecting the **Consolidation View Test** package for a **List** report.

 Note that only the selected query subjects appear in the data tree.

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2. Create a query with the following query items:

Query Subject	Query Item
Order Codes	**Order Number**
Products	**Product Line**
Sales Fact	**Quantity**
Returns Fact	**Return Quantity**

The results appear as follows:

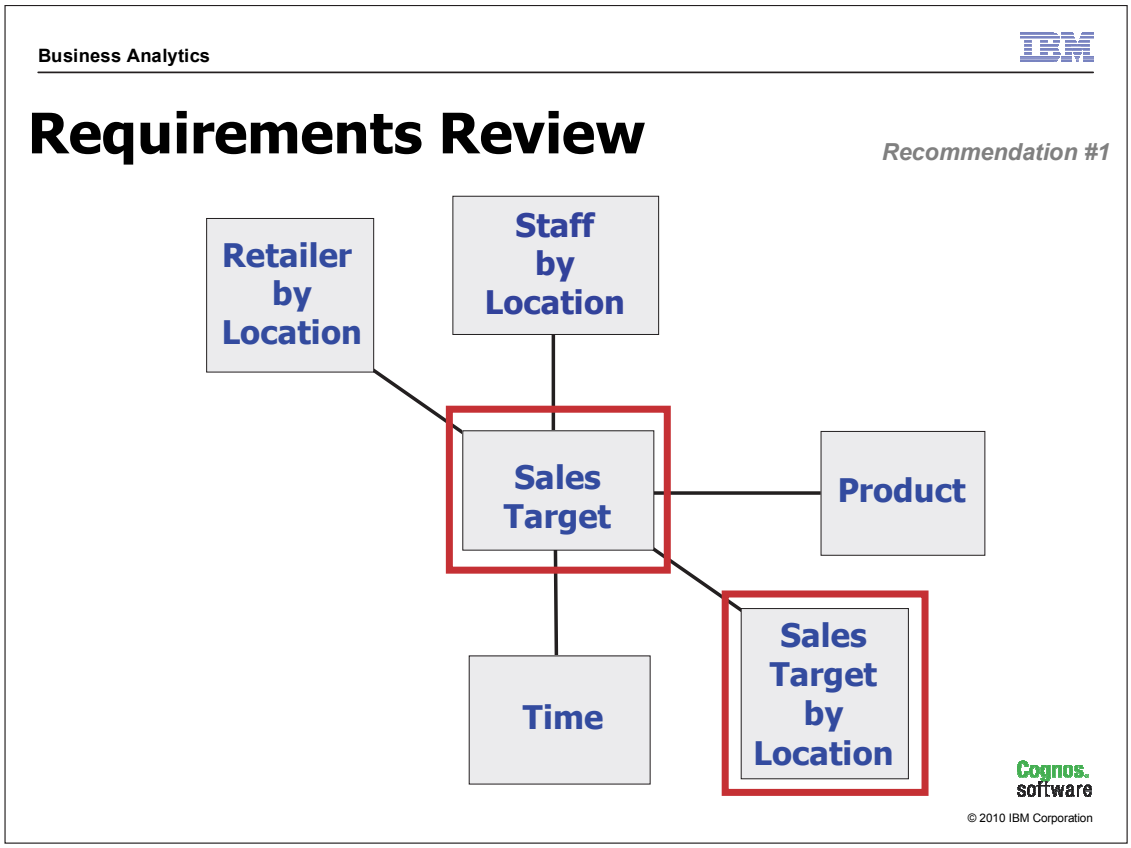
Order Number	Product Line	Quantity	Return Quantity
100001	Camping Equipment	256	
100001	Personal Accessories	92	
100002	Outdoor Protection	422	
100002	Personal Accessories	498	
100003	Outdoor Protection	4,359	
100003	Personal Accessories	107	19
100004	Camping Equipment	1,033	
100005	Golf Equipment	26	
100005	Personal Accessories	635	
100006	Outdoor Protection	3,771	

You have successfully created a report from a simplified and author-friendly model that hides the underlying complexity of the metadata.

3. Close the browser without saving the query.

Results:
You have created consolidated and simplified query subjects to meet reporting needs, and you have tested the resulting package in Query Studio.

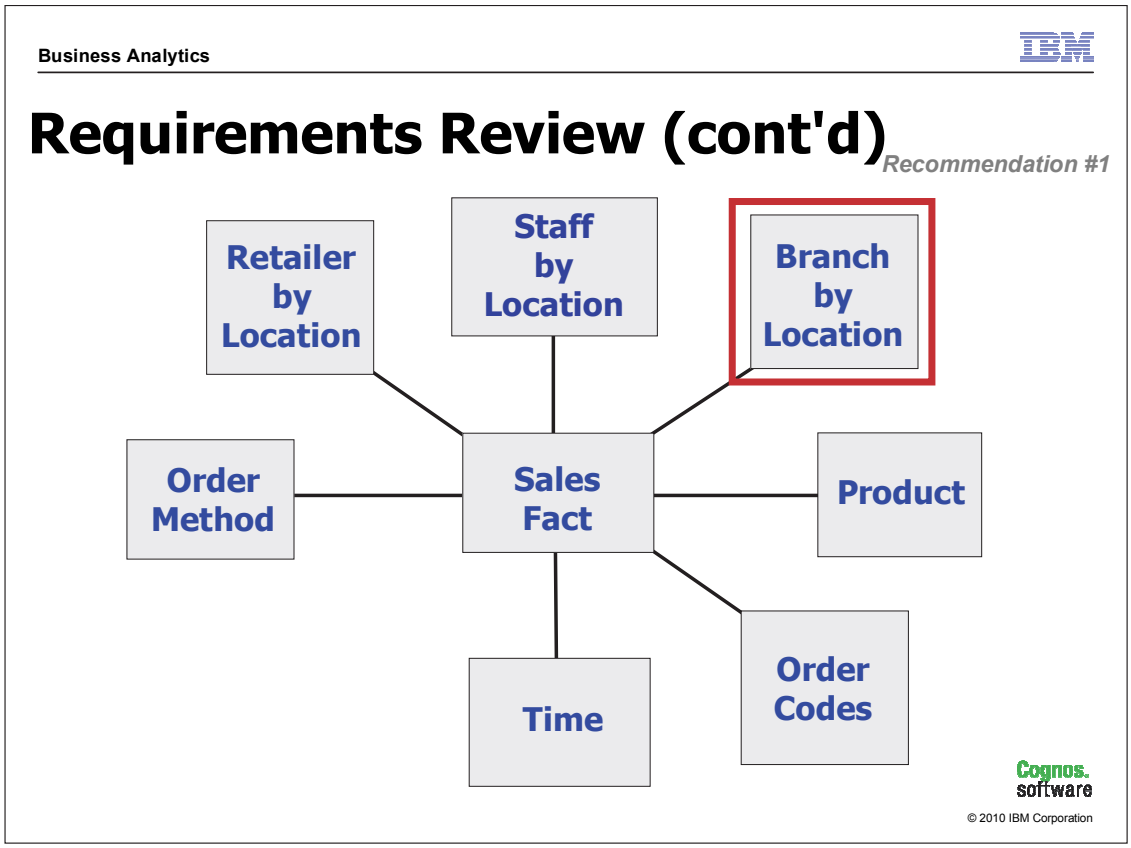
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During the modeling process, you discovered another important dimension that can be used to report against Sales Target. In the next workshop, you will create a consolidated model query subject to allow users to report on sales targets by location.

You will also create a simplified view of Sales Target.

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During the modeling process, you also discovered an alternate and important dimension that can be used to report against Sales Fact. In the next workshop, you will create a consolidated model query subject called Branch by Location.

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Workshop 2: Consolidate and Simplify the Model for Presentation

You will continue to consolidate related query items into single query subjects to simplify the presentation of metadata for authors.

Create consolidated and simplified query subjects in the Consolidation View to meet these needs, as follows:

- Create a consolidated Sales Target by Location dimension from SALES_REGION and COUNTRY as shown in the Workshop Results section that follows the Task Table.
- Create a consolidated Branch by Location dimension from Branch Region (alias), Branch Country (alias), and BRANCH as shown in the Workshop Results section that follows the Task Table.
- Create a simplified Sales Target Fact containing just gosales.SALES_TARGET> SALES_TARGET and renamed to mixed case.

For more detailed information outlined as tasks, see the Task Table on the next page.

To see the desired queries and model query subject contents, see the Workshop Results section that follows the Task Table.

Save the project when you are finished.

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Workshop 2: Task Table

Task	Where to Work	Hints
1. Create the consolidated Sales Target by Location dimension	Project Viewer, Query Subject Definition dialog box.	• SALES_REGION: SALES_REGION_CODE SALES_REGION_EN • COUNTRY: COUNTRY _CODE COUNTRY _EN • Rename query items to Sales Target Region Code, Sales Target Region, Sales Target Country Code, and Sales Target Country • Place Sales Target Region Code and Sales Target Country Code in a new Codes query item folder

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Task	Where to Work	Hints
2. Create the consolidated Branch by Location dimension	Project Viewer, Query Subject Definition dialog box.	• Branch Region (alias): Branch Region Code Branch Region • Branch Country (alias): Branch Country Code Branch Country • BRANCH: BRANCH_CODE ADDRESS1 ADDRESS2 CITY PROV_STATE POSTAL_ZONE • Place the three codes in a new Codes query item folder. • Rename all query items from BRANCH to mixed case with a 'Branch' prefix (for example, Branch Address 1) • Organize dimensions alphabetically

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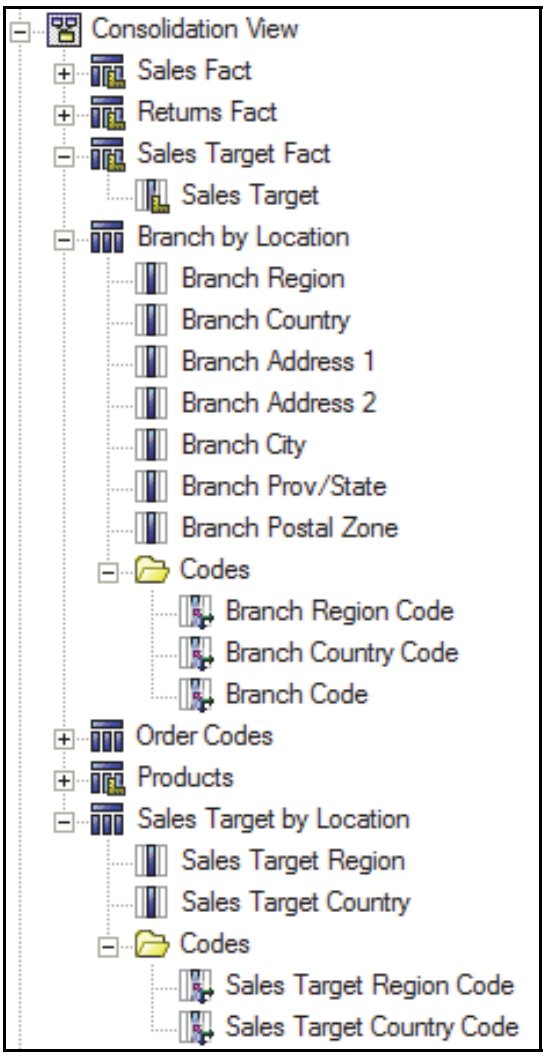
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3. Create a simplified Sales Target Fact.	Project Viewer, Query Subject Definition dialog box.	• SALES_TARGET > SALES_TARGET • Rename query item to Sales Target • Drag Sales Target Fact to just below Returns Fact • Save and close the project

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Workshop 2: Workshop Results

Your Consolidation View should appear as shown below:



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Business Analytics

Summary

- You should now be able to:
 - create virtual facts to simplify writing queries
 - create virtual dimensions to resolve fact-to-fact joins
 - create a consolidated modeling layer for presentation purposes
 - consolidate snowflake dimensions with model query subjects
 - simplify facts by hiding unnecessary codes

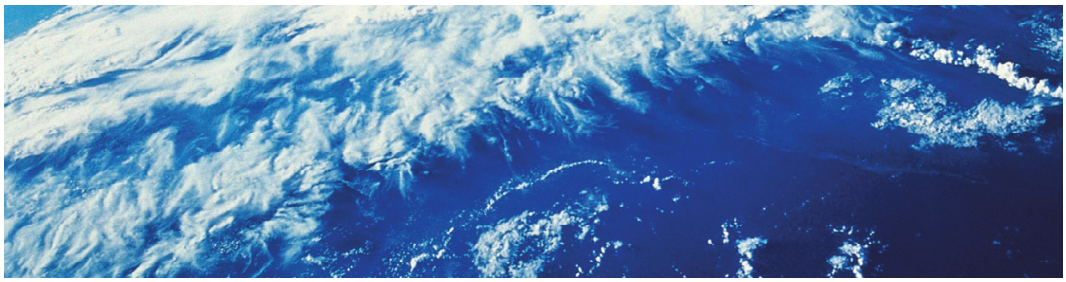
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Calculations and Filters

IBM Cognos BI



Business Analytics

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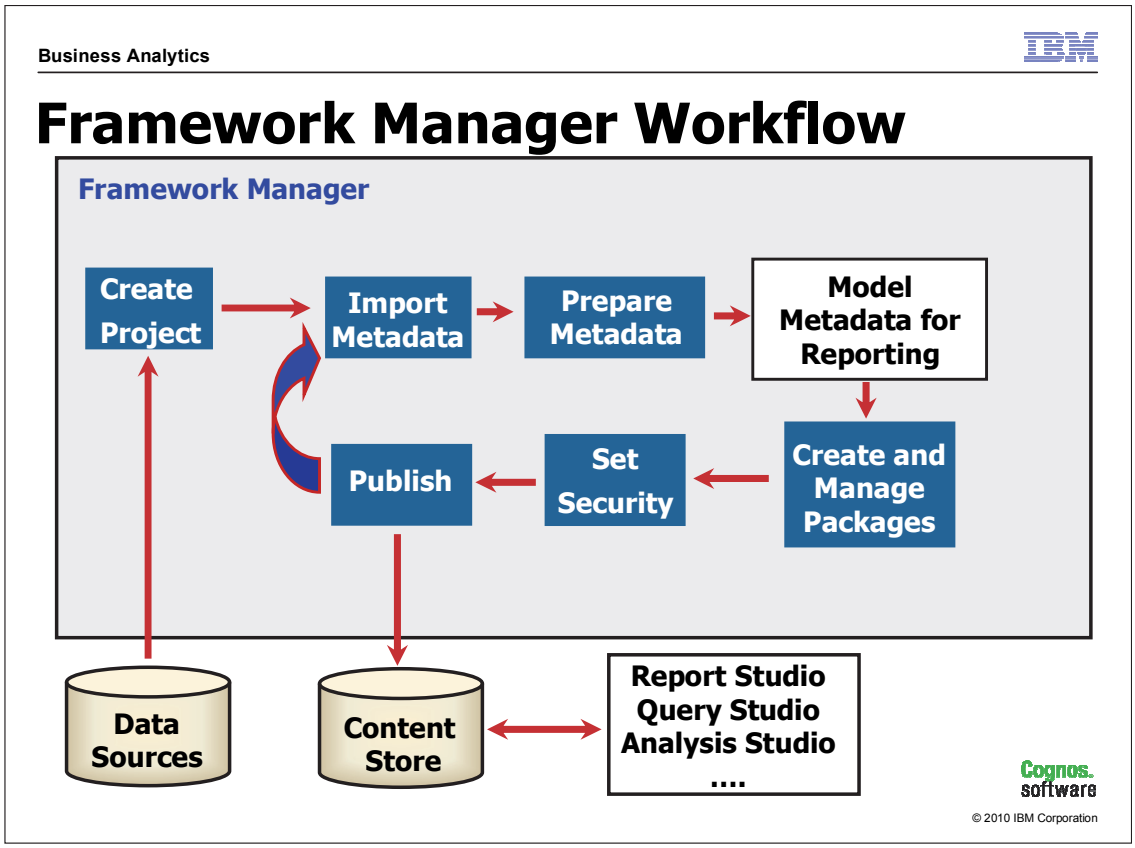
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Objectives

- At the end of this module, you should be able to:
 - use calculations to create commonly-needed query items for authors
 - use static filters to reduce the data returned
 - use macros and parameters in calculations and filters to dynamically control the data returned

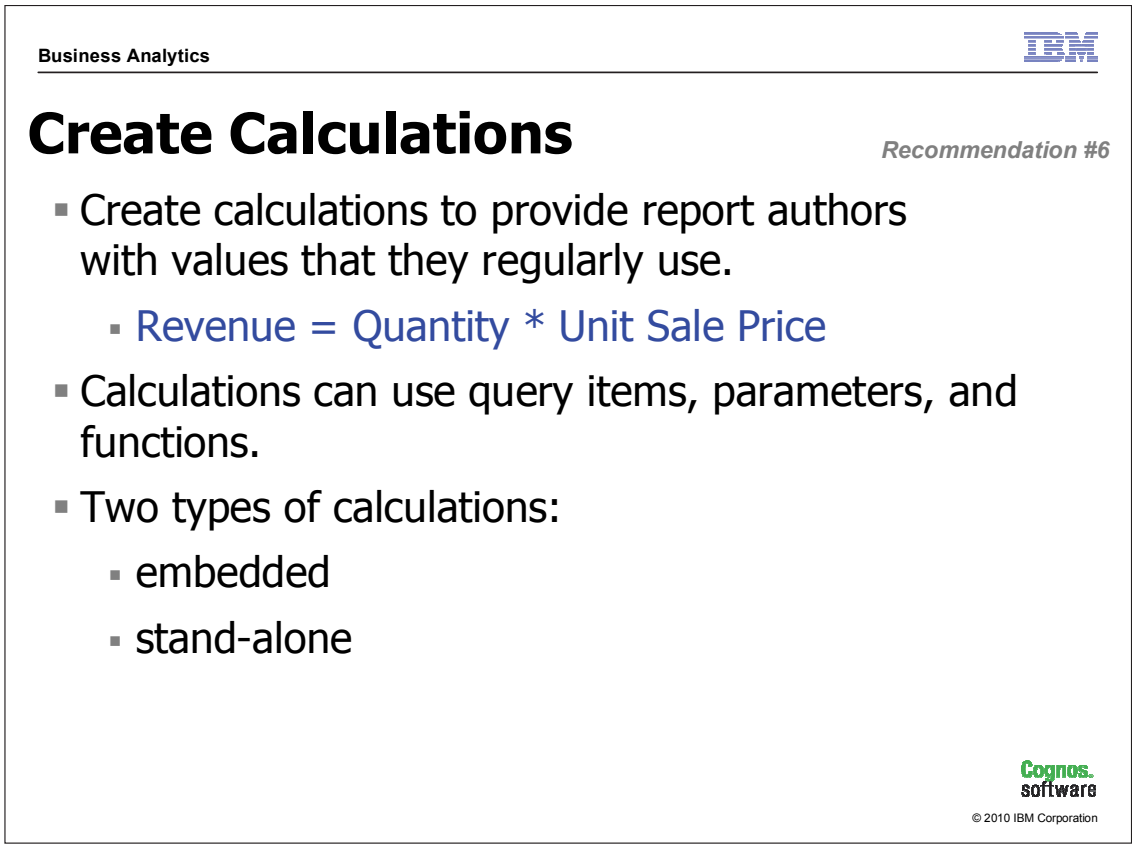
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This module deals with creating calculations and filters to add business logic to the model.

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If you want to create a calculation specifically for one query subject or dimension, you can embed the calculation directly in that object. For query subjects, this calculation can be done for either data source query subjects or model query subjects. However, it is recommended that you apply calculations in model query subjects wherever possible. This allows for better maintenance and change management.

Create a stand-alone calculation when you want to apply the calculation to more than one query subject or dimension. Stand-alone calculations are also valuable if you need to do aggregation before performing the calculation (as shown in Appendix A).

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Demo 1: Create Embedded Calculations

Purpose:
Report authors want to include the revenue, gross profit, and margin of each order in their reports. Therefore, you will create three embedded calculations in the Sales Fact query subject. This will produce three new query items.

Component: **Framework Manager**

Project: **GO Operational**

Task 1. Create the calculations.

1. In **Framework Manager**, close any projects that may be open, and then open the **GO Operational** model located at **C:\Edcognos\B5152\CBIFM-Start Files\Module 9\GO Operational**.
2. Expand **Foundation Objects View>gosales**, and then double-click **Sales Fact**.

 The calculations you are about to create could also be placed in the Consolidation View Sales Fact model query subject. However, placing them in the lower level increases opportunities for reusability.
3. Click **Add** in the bottom right corner.
4. In the **Name** box, type **Revenue**, and then, in the **Available Components** pane, double-click **Quantity**.
5. Click the **Functions** tab, expand **Operators**, and then double-click the multiplication operator (*****).

 Notice there is a description of the function in the Tips pane.

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6. Under **Available Components**, click the **Model** tab, and then double-click **Unit Sale Price**.

 The results appear as follows:

 [gosales].[Sales Fact].[Quantity] * [gosales].[Sales Fact].[Unit Sale Price]

7. Click **Test Sample**  to verify that the calculation works, click **OK**.
8. Create a **Gross Profit** calculation with the following expression:

 [gosales].[Sales Fact].[Revenue] - ([gosales].[Sales Fact].[Quantity] * [gosales].[Sales Fact].[Unit Cost])

 Where Revenue is the calculation you just created.
9. Create a **Margin** calculation with the following expression:

 [gosales].[Sales Fact].[Gross Profit] /[gosales].[Sales Fact].[Revenue]

 Where Gross Profit and Revenue are the calculations you just created.

 Currently the new calculations appear as attributes because they have not been evaluated yet.

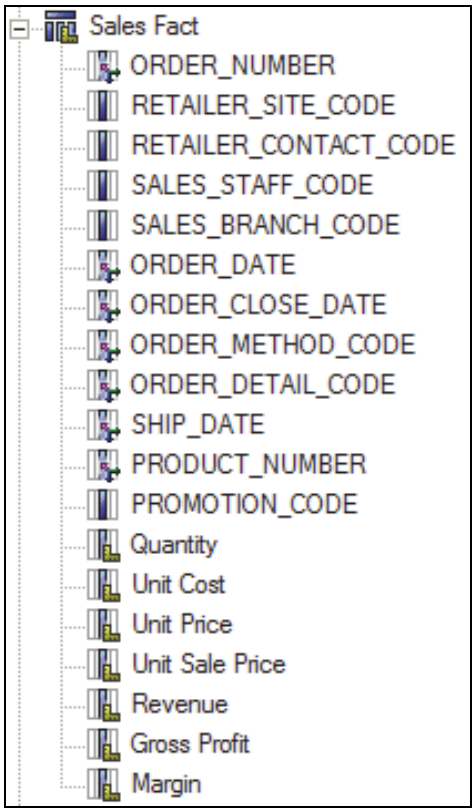
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10. Click **OK**.

 The query subject and its new calculations are evaluated.

 The results appear as follows:



 The calculations now appear as facts.

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Task 2. Set formatting properties on query items in the Foundation Objects View.

1. Under **Sales Fact**, select **Revenue** and **Gross Profit**.
2. If necessary, from the **View** menu, click **Properties**.
3. In the **Properties** pane, for the **Revenue** query item, set the **Format type** to **Currency**, and the **Currency** property to **$ (USD) - United States of America, dollar**.
4. Apply the same formatting to the **Gross Profit** query item by dragging down the small black arrow.
5. Format **Margin** as a percentage.

Task 3. Update the Consolidation View Sales Fact query subject and test.

1. In the **Consolidation View**, double-click **Sales Fact**.
2. Add the three new calculations from **Foundation Objects View > gosales > Sales Fact**.
3. Click **Revenue** and then click **Top**  to move it to the top of the list.
4. Click the **Test** tab, and then click **Test Sample**.

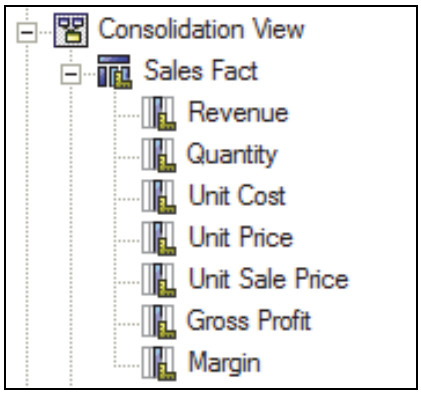
 Notice that Margin = Gross Profit / Revenue, as expected.

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5. Click **OK**.

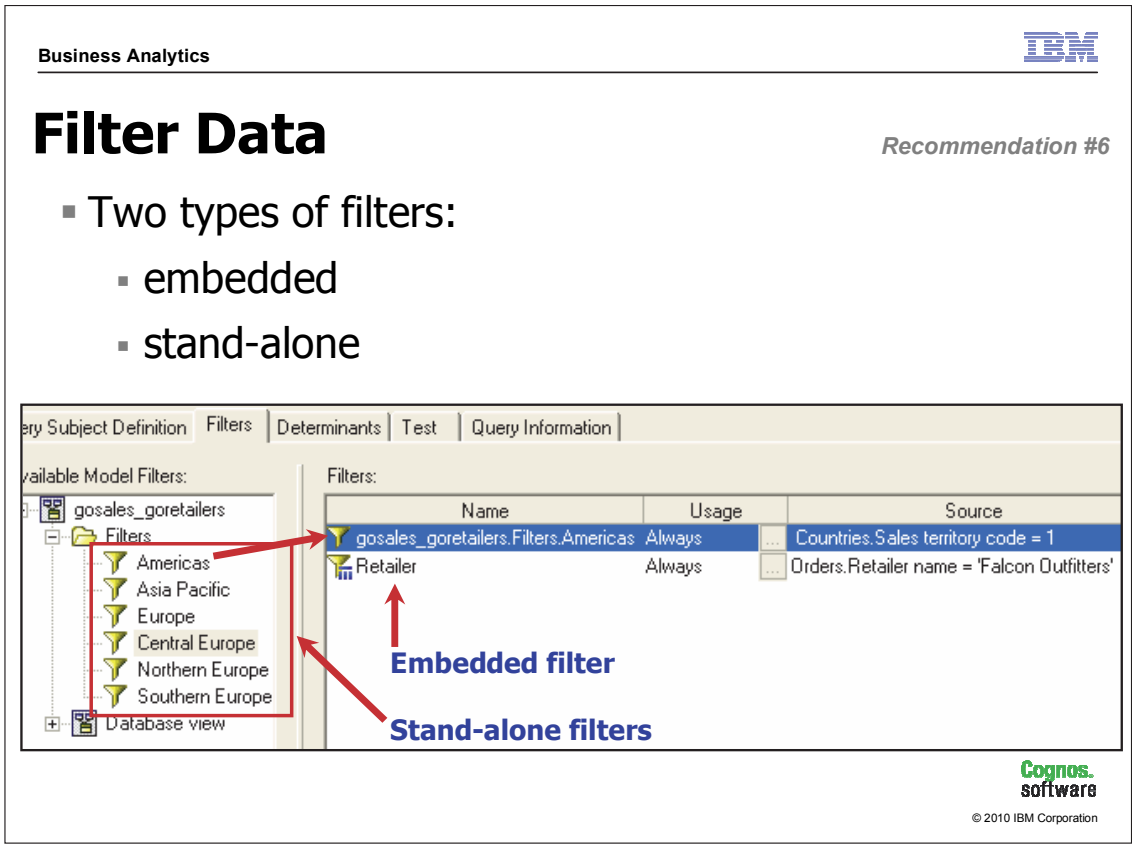
 The results appear as follows in the Project Viewer:



6. Save the project.

Results:
You created and tested three embedded calculations within the Sales Fact query subject. This produced three new query items that report authors can exploit.

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Again, embedded filters are appropriate when the filter is intended for just one query subject or dimension. Stand-alone filters are appropriate when required in multiple query subjects or dimensions or to make commonly used filters readily available for authors.

Filters have a Usage setting with the following options:

- Always - the filter will be applied in all instances regardless of whether the filtered query item is in the query or not
- Optional - the filter is not mandatory and users may choose to enter a filter value or leave it blank (only applies to filters that use a prompt value or macro)
- Design Mode Only - Limits the amount of data that is retrieved when testing in Framework Manager or at report design time (when authoring reports in Query Studio and Report Studio)

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Demo 2: Create Embedded and Standalone Filters

Purpose:
Employee data includes historical job information that is beyond the scope of the reporting application you are building. So you will restrict EMPLOYEE_HISTORY to each employee's current record.

Report authors also want the ability to easily restrict retailer data to specific regions. To do this, you will create standalone filters that authors can apply during report creation.

Components: **Framework Manager**, **Business Insight Advanced**

Project: **GO Operational**

Package: **GO Operational**

Task 1. Create an embedded filter to retrieve current employee records.

To restrict retrieval to an employee's current record, you can filter on EMPLOYEE_HISTORY.RECORD_END_DATE IS NULL. This signifies that the employee has not yet ended their current position.

You will place the filter on EMPLOYEE_HISTORY in the Foundation Objects View rather than on Staff by Location in the Consolidation View. This is because the filter causes the relationship between EMPLOYEE and EMPLOYEE_HISTORY to change from one-to-many to one-to-one, and all our relationships are in the Foundation Objects View. Changing this cardinality also prevents EMPLOYEE_HISTORY from acting as an ambiguous query subject.

1. In the **Project Viewer** pane, expand **Foundation Objects View>gosales**, and then double-click **EMPLOYEE_HISTORY**.

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2. Click the **Filters** tab, click **Add**, and then in the **Name** box, type **Current Employee History Record**.
3. In the **Available Components** pane, double-click **RECORD_END_DATE**.
4. Click in the **Expression Definition** pane at the end of the expression, and then type **IS NULL**.

 The results appear as follows:

 [gosales].[EMPLOYEE_HISTORY].[RECORD_END_DATE] IS NULL
5. Click **OK**, click the **Test** tab, and then click **Test Sample**.

 The results appear as follows:

Test results

TORY_PARENT	EMPLOYEE_CODE	RECORD_START_DATE	RECORD_END_DATE	POSITION_CO
	10004	Dec 11, 2001 12:00:00 AM		4500
	10005	Nov 24, 2003 12:00:00 AM		5700
	10006	May 10, 2006 12:00:00 AM		5500
	10007	Oct 9, 2003 12:00:00 AM		5600
	10012	Mar 22, 2005 12:00:00 AM		5400
	10013	Nov 7, 2000 12:00:00 AM		5300
	10014	May 12, 2003 12:00:00 AM		5700
	10015	Apr 18, 2007 12:00:00 AM		5600
	10016	Dec 20, 2004 12:00:00 AM		5700
	10017	Dec 20, 2004 12:00:00 AM		5400

 Just one record for every employee is returned and each has a null RECORD_END_DATE.
6. Click **OK**.
7. Right-click **EMPLOYEE_HISTORY** and click **Launch Context Explorer**.
8. Click **Show Related Objects**, and then double-click the relationship between **EMPLOYEE_HISTORY** and **EMPLOYEE**.
9. Change the **EMPLOYEE_HISTORY** side to **1..1**, reflecting the impact of the new filter.
10. Click **OK**, close the **Context Explorer**, and then save the project.

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Task 2. Create Standalone Retailer Location Filters.

1. In **Foundation Objects View>gosales**, right-click **SALES_REGION**, click **Test** and then click **Test Sample**.

 The five regions are as follows:
 710 = Americas
 740 = Asia Pacific
 750 = Northern Europe
 760 = Central Europe
 770 = Southern Europe

2. Click **Close**, and then, in the **Consolidation View**, create a new folder called **Model Filters**.
3. In the new **Model Filters** folder, create a new folder called **Retailer Location Filters**.
4. Right-click **Retailer Location Filters**, point to **Create**, and then click **Filter**.
5. In the **Name** box, type **Americas**.
6. In the **Available Components** pane, under **Consolidation View**, expand **Retailer by Location>Codes**.
7. Add **Retailer Site Region Code** to the **Expression definition** pane, and then type **= 710**.

 The results appear as follows:

 [Consolidation View].[Retailer by Location].Retailer Site Region Code] = 710
8. Click **OK**.

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9. Repeat steps **4** to **8** to create new filters using the appropriate **Retailer Site Region Code**.

Retailer Site	Retailer Site Region Code
Asia Pacific	**740**
Northern Europe	**750**
Central Europe	**760**
Southern Europe	**770**

Tip: You can also copy the Americas filter and simply edit it to meet your needs.

The expression for Asia Pacific will appear as follows:

[Consolidation View].[Retailer by Location].Retailer Site Region Code] = 740

The results appear as follows:



10. Save the project.

Task 3. Test the Standalone Filters.

1. Publish the **GO Operational** package.
2. If necessary, open **IBM Cognos Connection**, log on, open **Business Insight Advanced**, and then select the **GO Operational** package for a **List** report.

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3. In the **Insertable Objects** pane, expand **Consolidation View**>**Retailer by Location**.
4. Add **Retailer Site Country** to the report.
5. Expand **Model Filters**>**Retailer Location Filters**, and then drag **Americas** onto the report.

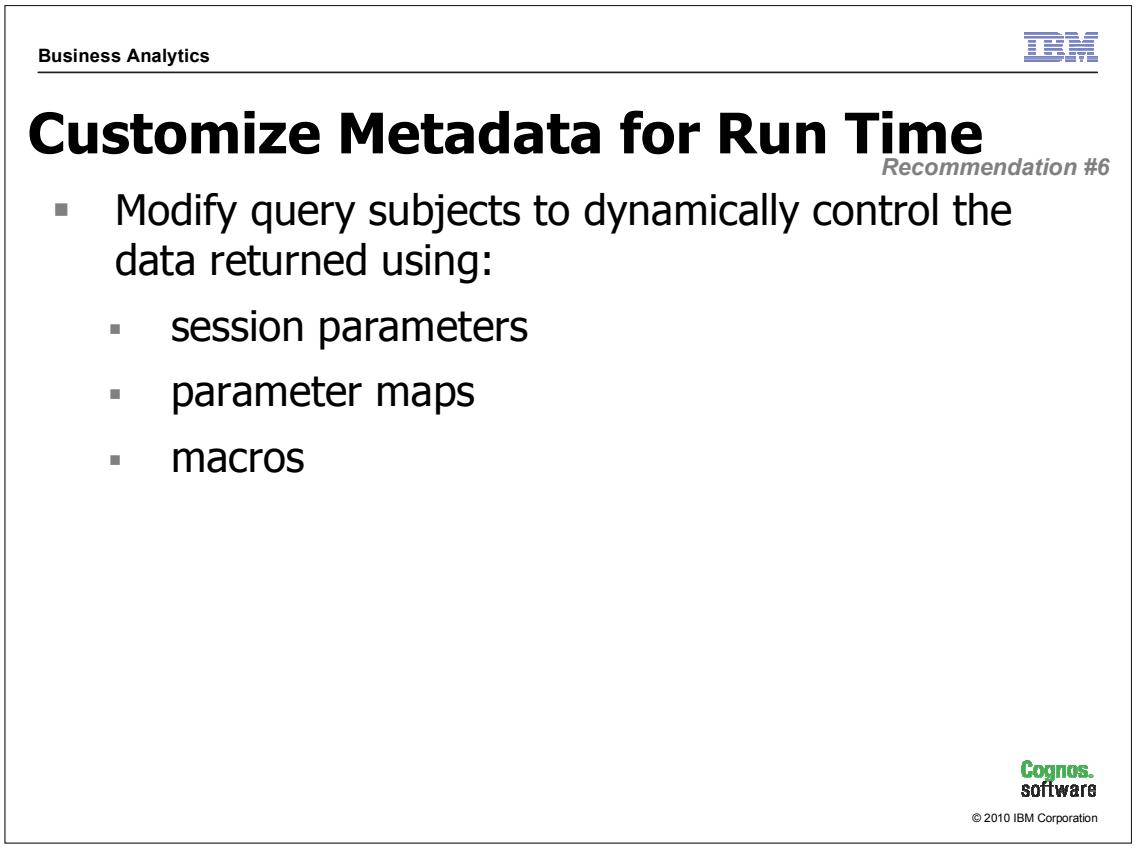
 The results appear as follows:



 The report is limited to records for the American continents.
6. Close your browser without saving the report, and leave Framework Manager open for the next demo.

Results:
You embedded a filter into EMPLOYEE_HISTORY to restrict the data to each employee's current record. You also created stand-alone filters for retailer locations that authors can apply during report creation.

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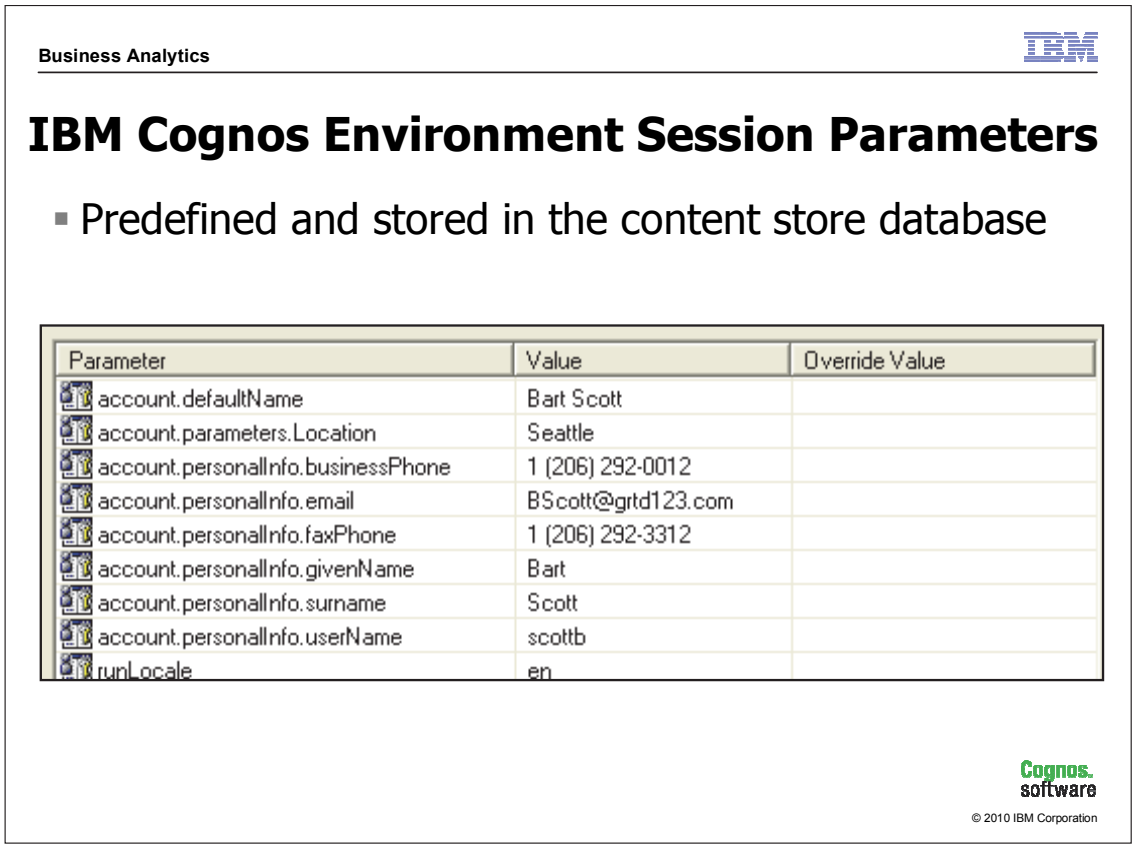


This concept can be used to dynamically return data from specific columns or rows, and even from specific data sources.

One example is to dynamically implement security by using a calculation to retrieve a user's account, group, or role information and then implement row-level security based on values stored in the data source.

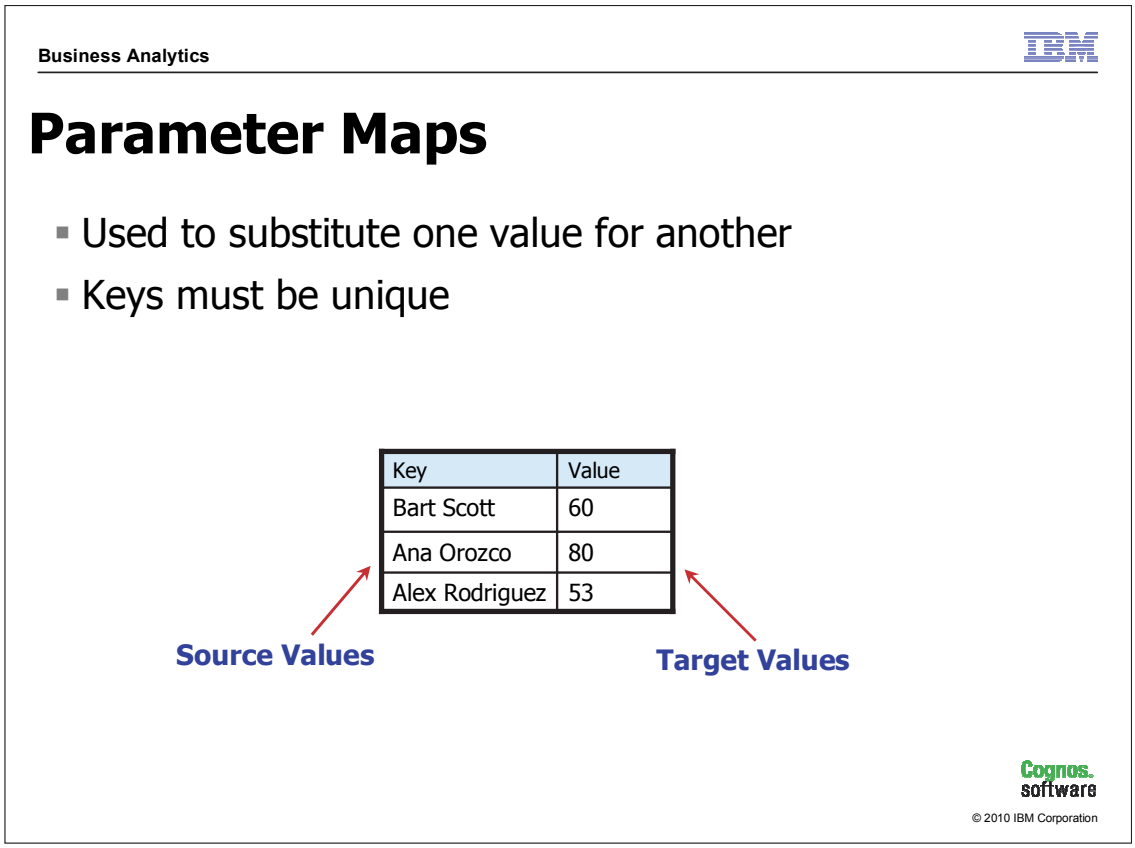
Another example might be to retrieve location specific data for a particular user. For example, if a user works in Mexico, you can use a calculation to return sales values for Mexico by querying the Revenue_Mexico column rather than other columns in the table such as Revenue_Canada or Revenue_Germany.

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A session parameter returns session information at run time (for example, runLocale or account.UserName).

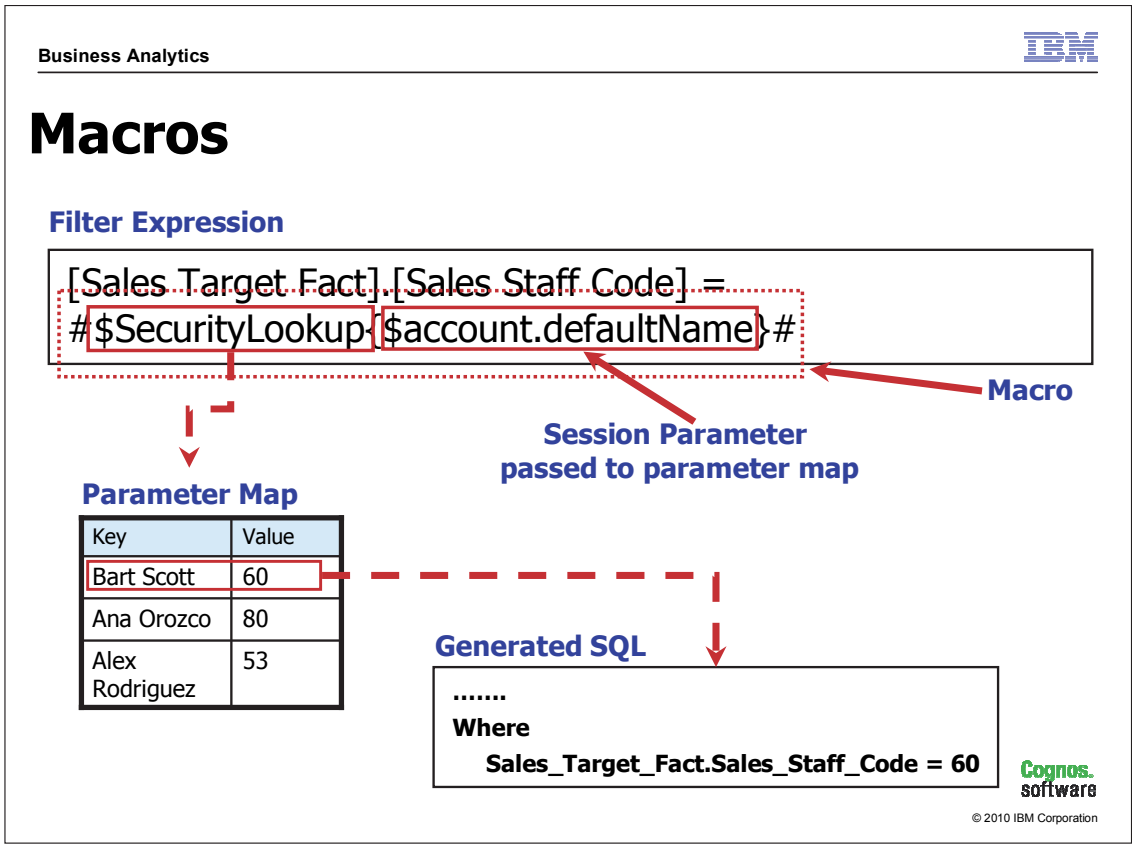
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A parameter map is a two-column table, mapping a set of keys (source) to a set of substitution values (target).

The above example uses a parameter map to convert the account.DefaultName session parameter to a suitable value in the data, in this case a staff key value.

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A macro is a fragment of code that you can insert within filters, calculations, properties, and so on, that are to be evaluated at run time. Macros are enclosed by the # character.

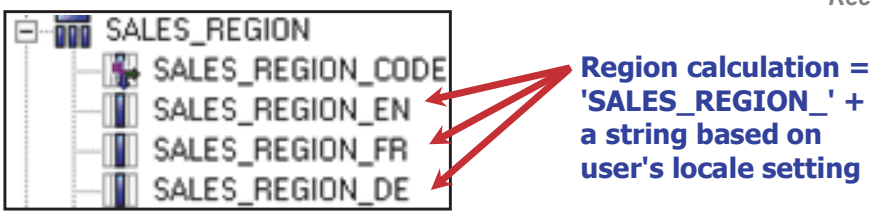
You will use the technique illustrated in the slide later in the course when applying security.

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Business Analytics

Dynamically Retrieve Language Column

Recommendation #6



1. Call runLocale session parameter: en, en-uk, fr, ...
2. Use a parameter map to convert to EN, FR, ...
3. Concatenate the results with a string to form the desired column name
 - SALES_REGION_EN
 - SALES_REGION_FR
 - and so on

Cognos. software

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In the next demo, you will dynamically return a specific column in the data source based on a user's locale.

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Demo 3: Calculate Based on Local Language

Purpose:
Authors at The Great Outdoors Company would like report consumers to automatically view region names in the language of their locale. To do this, you will replace Retailer Site Region with a calculation that references a parameter map and a session parameter. You will then make this calculation standalone, so that you can reuse it for Branch Region, Staff Region, and Sales Target by Location.

Component: **Framework Manager**

Project: **GO Operational**

Task 1. Create a parameter map.

1. In the **Project Viewer** pane, **Foundation Objects View>gosales**, expand **SALES_REGION**.

 This query subject has column-based multilingual data. You pick the appropriate language column for the language you wish to view the data in.

2. Double-click **Retailer Site Region (alias)**.

 This model query subject was created with just one language query item, SALES_REGION_EN. You want to change this to pick the underlying query item based on a user's locale session parameter at run time. For example, the session locales for United States and France are en-us and fr-fr.

3. Click **Cancel**.

 You will now create a parameter map to substitute a locale session parameter to a value found in the data.

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4. Right-click **Parameter Maps**, point to **Create**, and then click **Parameter Map**.

 The Create Parameter Map wizard opens. You can type in the values if you only support a small set of languages, or import the values from a file. You can also base the parameter map on query items within the model. For example, you may have a table in the database that is used to map language locales to language values matched by the data in other tables. If this is the case and the table is quite large, consider placing a filter on the query subject based on the session parameter you are using to look up the value (in this case runLocale). This reduces the record set down to one record rather than forcing a scan of the entire table at run time. For example, if the value is en-us at run time, then the query subject will only return one row consisting of en-us and EN (the key field and the value field) instead of all rows. In other words, you are dynamically reducing the parameter map list to one record before accessing it for a value.

 For this exercise there is no table that contains these mapping values, so you will use a text file that has the mappings entered for you.

5. In the **Name** box, type **Language_lookup**, and then click **Next**.
6. Click **Import File**.
7. Next to the **Filename** box, click **Browse**.
8. Navigate to **<IBM Cognos install drive> Program Files\IBM\cognos\ c10\webcontent\ samples\models**, click **Language_lookup.txt**, and then click **Open**.
9. Click **OK**.

 The values in the file are imported. Note that 'en-us' (and all other English variants) map to 'EN'. The same applies for other languages and their locales.

10. Click **Finish**.

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Task 2. Create an embedded calculation for multilingual data.

1. In **Foundation Objects View>gosales>Retailer Site Region (alias)**, double-click **Retailer Site Region**.
2. In the **Expression definition** pane, to the left of **[gosales].[SALES_REGION].[SALES_REGION_EN]**, type **#'**
3. Replace **EN]** with **' +**

 The results appear as follows:

 #'[gosales].[SALES_REGION].[SALES_REGION_' +
4. Under **Available Components**, click the **Parameters** tab, expand **Parameter Maps**, and then double-click **Language_lookup**.
5. Collapse **Language_lookup**, expand **Session Parameters**, and then double-click **runLocale**.
6. At the end of the expression, type **+ ']'#**

 Delete any extra # symbols so the results appear as follows:

 #'[gosales].[SALES_REGION].[SALES_REGION_' +
 $Language_lookup{$runLocale} + ']'#

 The # character at the beginning and the end of the expression identify this expression as a macro.

 Note: This technique hard codes the path to your source query item. If you move or rename the source, you will have to update this calculation manually.
7. Click **Test Sample**  to verify that the calculation works for your current locale, and then click **OK**.

 The Sales Region data will all display in the appropriate language.
8. Save the project.

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Task 3. Test the calculation under a different language.

1. From the **Project** menu, point to **Languages**, and then click **Define Languages**.
2. Scroll down to **French**, double-click **French** to add it to the list of **Project languages**, and then click **OK** twice.
3. If necessary, from the **View** menu, click **Tools**.
4. In the **Tools** window, if necessary, click the **Summary** tab, and then change **Active Language** to **French**.

 Notice that all object names in the Project Viewer are preceded by "(fr)". This is to remind you to translate the strings if required.
5. Right-click **(fr) Retailer Site Region (alias)**, click **Test**, and then click **Test Sample**.

 The results appear as follows:

Test results	
(fr) Retailer Site Region Code	(fr) Retailer Site Region
710	Amériques
740	Asie-Pacifique
750	Europe septentrionale
760	Europe centrale
770	Europe méridionale

 The names appear in French based on the macro you created.
6. Click **Close**, and then change the **Active Language** back to **English**.

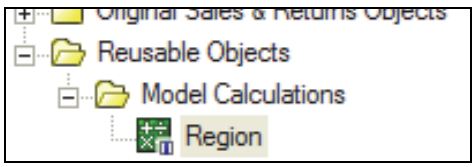
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Task 4. Make the calculation reusable.

1. In **Foundation Objects View>gosales**, double-click **Retailer Site Region (alias)**.
2. Right-click **Retailer Site Region**, and then click **Convert to Stand-alone Calculation**.
3. Click **OK**, and then, double-click the new **Retailer Site Region** calculation at the bottom of the **gosales** namespace.

 The calculation has been preserved.
4. Click **Cancel**.
5. In the **gosales** namespace, create a folder called **Reusable Objects**, and then create a folder called **Model Calculations** in the **Reusable Objects** folder.
6. Drag the **Retailer Site Region** calculation into the **Model Calculations** folder.
7. Rename the calculation to **Region**.

 The results appear as follows:



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Task 5. Apply the calculation to Branch Region (alias).

1. Expand **Branch Region (alias)**, and then double-click **Branch Region**.

 The expression uses the English region column. Rather than recreate the more generic language-based version, you will reuse the Region calculation.

2. Delete the expression in the **Expression definition** box.
3. In the **Available Components** pane, expand **Reusable Objects>Model Calculations**, and then double-click **Region**.
4. Test the expression, and then click **OK**.
5. Repeat steps **1** to **3** to apply the **Region** calculation to the **Staff Region (alias)** query subject, and the **Sales Target by Location** query subject located in the **Consolidation View**.

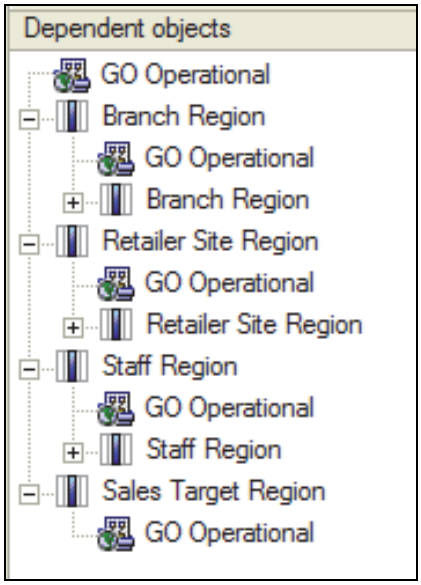
 To see if you applied the calculation in all the required locations, you can use the Show Object Dependencies feature.

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6. Right-click the **Region** calculation, and then click **Show Object Dependencies**.

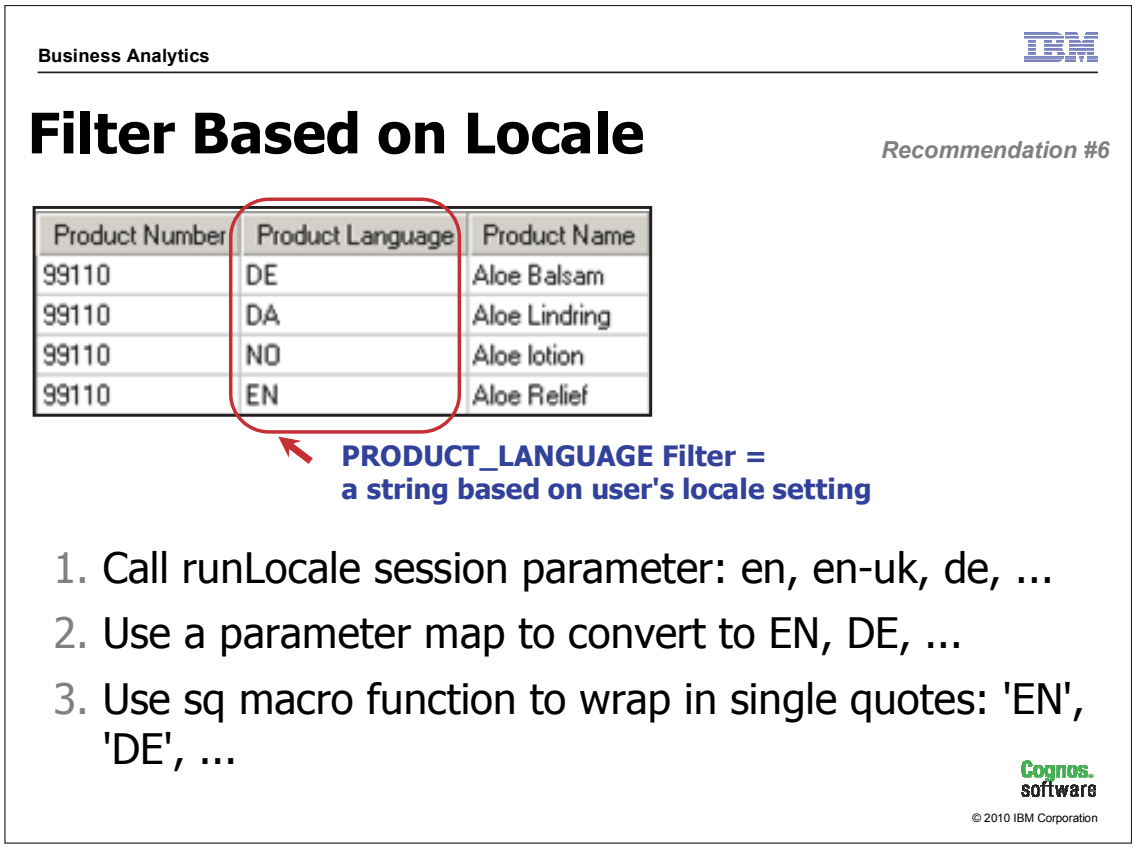
 In the Tools pane, a list of dependant objects is displayed.



 You can click any of these objects to give them focus in the Project Viewer or Diagram pane. By doing this, you can verify you applied the calculation in all required areas.

Results:
You modified Retailer Site Region (alias) to automatically view region names in a language based on the report consumer's locale. You then made the calculation stand-alone, and reused it for the Branch Region (alias).

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The same process that you used to create a calculation when the language selection is column-based can be used to create a filter when the language selection is row-based. Instead of building up a string for the column name, you simply create the string matching a PRODUCT_LANGUAGE row value and filter on this value.

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Workshop 1: Filter Local Language

Each product has multiple records in the PRODUCT_NAME_LOOKUP table, one per language. Authors at the Great Outdoors Company want report consumers to automatically view product names in the language of their locale. To do this, add a filter to PRODUCT_NAME_LOOKUP which equates PRODUCT_LANGUAGE to #sq($Language_lookup {$runLocale}) #

To do this:

- Use the runLocale session parameter to extract the locale.
- Convert the locale to the format of our PRODUCT_LANGUAGE column by using the Language_lookup parameter map that you created earlier.
- Wrap the string in single quotes by using a macro called sq.

Note that the filter changes the nature of the relationship between PRODUCT_NAME_LOOKUP and Product Type & Product to be 1..1 on both sides. Applying this filter and changing the cardinality will resolve unexpected results when querying Product Name.

Test your underlying changes in the Consolidation View using Product>Product Name and Sales Fact>Revenue.

For more detailed information outlined as tasks, see the Task Table on the next page.

To see the desired filters, see the Workshop Results section that follows the Task Table.

Save the project when finished.

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Workshop 1: Task Table

Task	Where to Work	Hints
1. Add a filter to PRODUCT_ NAME_LOOKUP	Project Viewer, Foundation View, gosales	• Double-click the query subject. • Click the Filters tab. • Click Add. • Name it 'Language Filter'.
2. Create the filter definition.	Available Components, Expression definition	• Add PRODUCT_LANGUAGE to the expression. • Type = at the end of the expression. • From Available Components, on the Parameters tab, expand Macro Functions and double-click sq. • Expand Parameter Maps and double-click Language_lookup. • Expand Session Parameters and double-click runLocale. • Click OK then test the filter using the Test tab. All product names should be in your current language.

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Task	Where to Work	Hints
3. Update relationship.	Project Viewer, Context Explorer	• Change the relationship between PRODUCT_NAME_LOOKUP and Product Type & Product to be 1..1 on both sides. • Test in the Consolidation View using Products>Product Name and Sales Fact>Revenue • Save the project.

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Workshop 1: Workshop Results

Your Local Language filter in PRODUCT_NAME_LOOKUP should appear as follows:

[gosales].[PRODUCT_NAME_LOOKUP].[PRODUCT_LANGUAGE] = #sq($Language_lookup{$runLocale})#

Your test on Product Name and Revenue should appear as follows:

Product Name	Revenue
Flicker Lantern	8624.64
Polar Ice	9411.6
Edge Extreme	18032.22
Bear Edge	6690.8
Glacier GPS Extreme	24747.82
Mountain Man Deluxe	6825.6
Insect Bite Relief	2532
BugShield Extreme	21170.52
Sun Shield	6376.32
Seeker 50	10975.36
Polar Extreme	2733.15
Hibernator Lite	29658.12
Star Lite	89841.42
Star Gazer 2	75289.35

Product names are now only returned in one language.

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Workshop 2: Calculate Based on Local Language

Recall that to meet business needs, you created a reusable Region calculation for both Retailer Site Region and Branch Region as well as the Sales Target by Location query subject in the Consolidation View. You will now do the same thing for Retailer Site Country, Branch Country, and Sales Target by Location with a Country calculation.

Create a calculation as follows:

- Create a new calculation in Reusable Objects>Model Calculations, called Country.
- Set its expression to

 #'[gosales].[COUNTRY].[COUNTRY_' + $Language_lookup{$runLocale} + ']'#
- Change the definitions of Branch Country (alias)>Branch Country, Retailer Site Country (alias)>Retailer Site Country, Staff Country (alias), and Sales Target by Location in the Consolidation View to point to this calculation.

For more detailed information outlined as tasks, see the Task Table on the next page.

Save the project when finished.

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Workshop 2: Task Table

Task	Where to Work	Hints
1. Create a Country calculation.	Project Viewer, Foundation View, gosales, Reusable Objects, Model Calculations	• Right-click the Model Calculations folder, Create > Calculation. • Name the calculation Country.
2. Create the expression.	Available Components, Expression definition	• Set its expression to #'[gosales].[COUNTRY].[COUNTRY_' + $Language_lookup{$runLocale} + ']'#
3. Change the four query subjects to use the calculation.	Project Viewer, Query Subject Definition dialog boxes for Retailer Site Country (alias) and Branch Country (alias)	• In the Branch Country (alias) query subject, edit Branch Country. • Delete the Expression definition. • In Available Components, locate the new calculation and add it to the Expression definition. • Test, and then click OK. • Repeat for Retailer Site Country (alias), Staff Country (alias), as well as Sales Target by Location in the Consolidation View. • Save and close the project.

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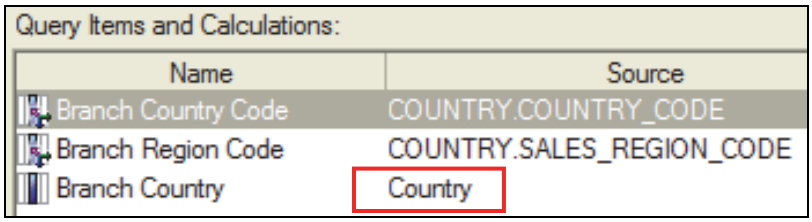
Workshop 2: Workshop Results

Your Country calculation expression should appear as shown below:

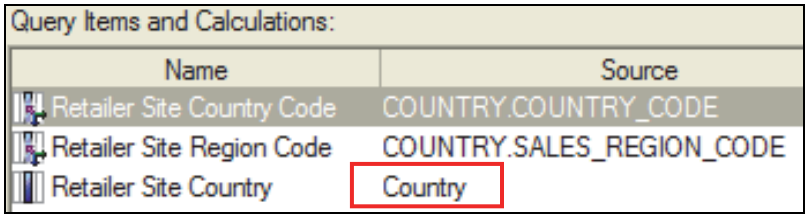
#'[gosales].[COUNTRY].[COUNTRY_' + $Language_lookup{$runLocale} + ']'#

This new calculation should be referenced in the following:

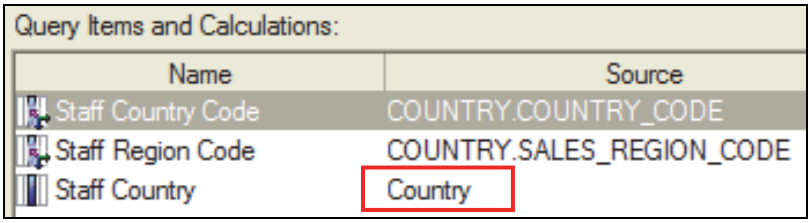
Your Branch Country (alias) model query subject



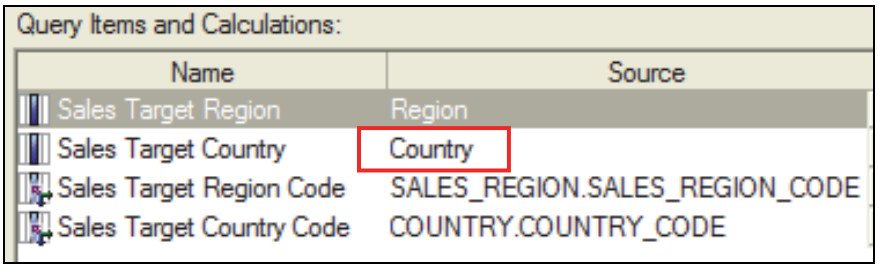
Your Retailer Site Country (alias) model query subject



Your Staff Country (alias) model query subject



Your Sales Target by Location model query subject



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Summary

- You should now be able to:
 - use calculations to create commonly-needed query items for authors
 - use static filters to reduce the data returned
 - use macros and parameters in calculations and filters to dynamically control the data returned

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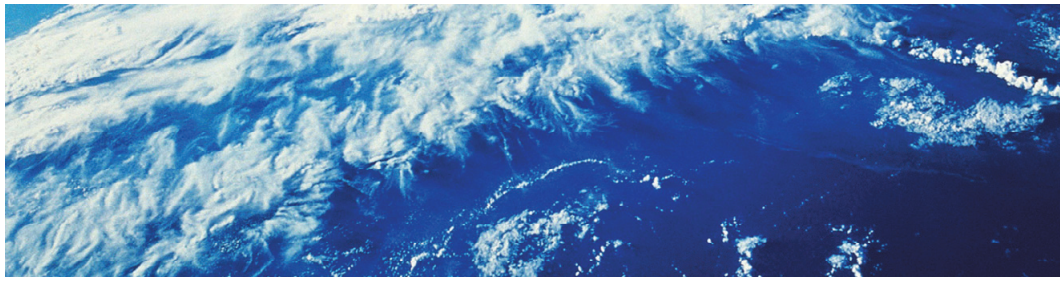
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Implement a Time Dimension

IBM Cognos BI



Business Analytics

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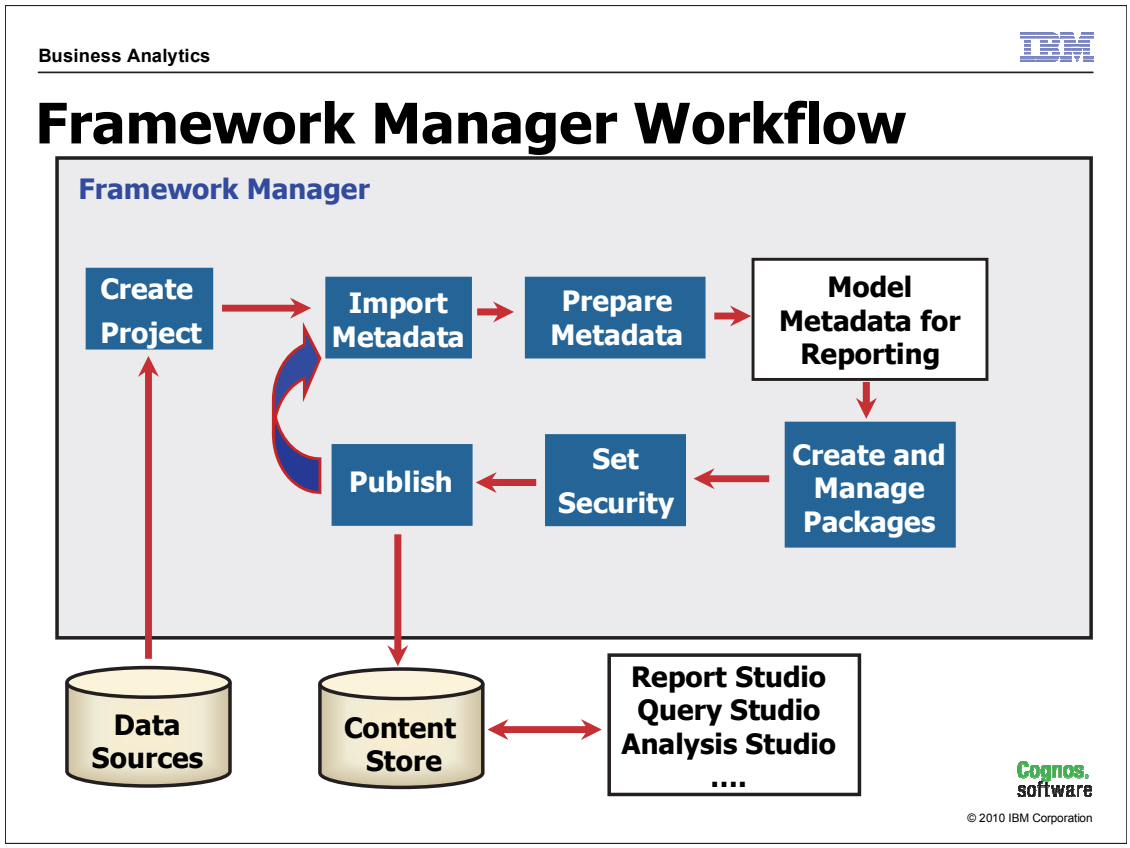
Objectives

- At the end of this module, you should be able to:
 - make time-based queries simple to author by implementing a time dimension
 - resolve confusion caused by multiple relationships between a time dimension and another table

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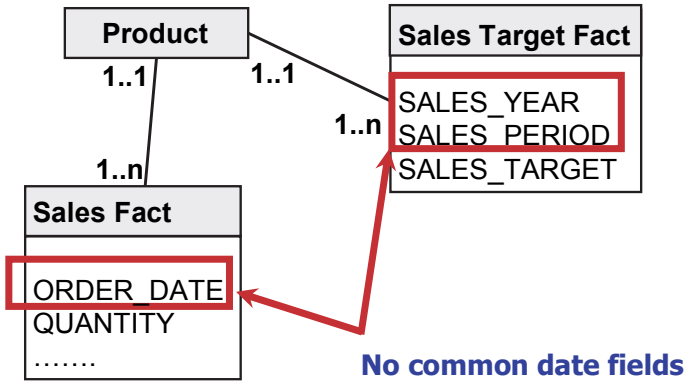
This module teaches the technique of implementing a time dimension in an operational model to simplify time-based queries across different facts.

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Report without a Time Dimension

- Reports require date calculations to match fields



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Either modelers or report authors must create calculations that manipulate date data to create matching values that can be used to compare data from different areas of the business. This can cause slower performance because you are now comparing data on non-indexed values.

In the slide example, you would need to create two calculations on ORDER_DATE in the Sales Fact query subject to match the SALES_YEAR and SALES_PERIOD fields in the Sales Target Fact query subject. You will see this in the next demo.

Other issues when using date fields from fact tables include the inability to properly stitch these queries together since there is no conformed dimension used.

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Demo 1: Report without a Time Dimension

Purpose:
A typical business report compares the monthly sales targets to actual sales. You will see if this is easily accomplished with your current data.

Components: **Framework Manager**, **Business Insight Advanced**

Project: **GO Operational**

Package: **GO Operational**

Task 1. Examine problems when a time dimension is absent.

1. In **Framework Manager**, close any projects that may be open, and then open the **GO Operational** project located at **C:\Edcognos\B5152\CBIFM-Start Files\Module 10\GO Operational**.
2. If prompted, log in as User ID **admin**, and Password **Education1!**.
3. Publish the **GO Operational** package, launch **IBM Cognos Connection**, log on, and then open **Business Insight Advanced** selecting the **GO Operational** package for a **List** report.

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4. Add the following items to the report from **Foundation Objects View**:

Query Subject	Query Item
Sales Fact	**ORDER_DATE** **Revenue**
SALES_TARGET	**SALES_YEAR** **SALES_PERIOD** **SALES_TARGET**

The results appear as follows:

ORDER_DATE	Revenue	SALES_YEAR	SALES_PERIOD	SALES_TARGET
Jan 12, 2004 12:00:00 AM	$39,036,796.40	2004	1	57,628,100
Jan 13, 2004 12:00:00 AM	$11,488,458.59	2004	2	67,795,500
Jan 14, 2004 12:00:00 AM	$3,232,160.48	2004	3	69,741,700
Jan 15, 2004 12:00:00 AM	$3,080,441.44	2004	4	59,954,700
Jan 16, 2004 12:00:00 AM	$1,976,896.69	2004	5	67,525,900
Jan 19, 2004 12:00:00 AM	$2,159,831.74	2004	6	73,594,900

The year and period (month) from SALES_TARGET do not match those in the ORDER_DATE from Sales Fact. You cannot get expected results without using a time dimension or creating calculations or modeling complex summary queries that manipulate date fields to tie the data together.

For example, you could extract the year and month from ORDER_DATE to match the fields in SALES_TARGET using functions such as:

- Year(ORDER_DATE)
- Month(ORDER_DATE)

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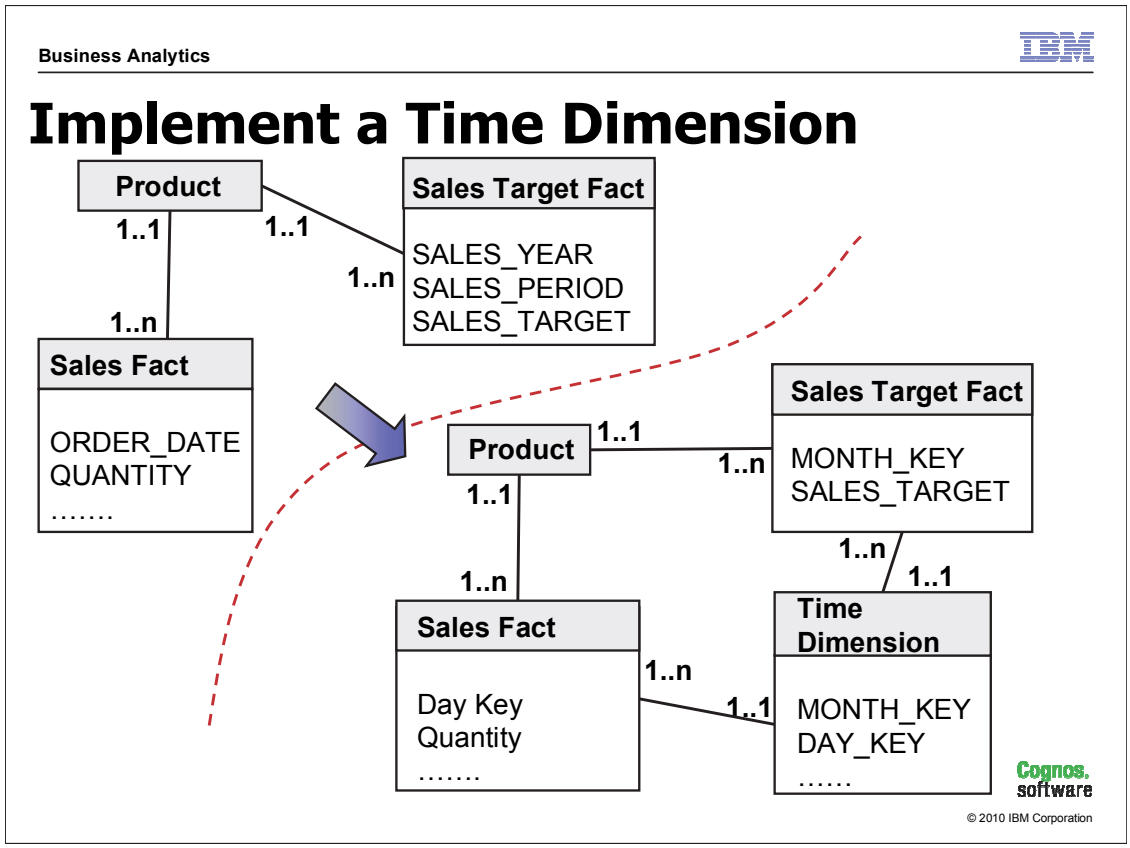
You could then sort in ascending order on the two new columns in order to match them to the SALES_YEAR and SALES_PERIOD columns from SALES_TARGET.

However, this cannot be accomplished in Query Studio and therefore requires the modeler to create the calculations or restricts these types of calculations to Report Studio authors. The results also do not properly stitch the two fact queries because the items used to compare the data do not come from a conformed source.

5. Return to **IBM Cognos Connection**, and do not save the report.

Results:
You identified the complexity of trying to create a time-based report without a time dimension. Without a conformed time dimension, you cannot achieve a proper stitch query and require calculations in order to match date fields from different sources.

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A time dimension provides a conformed dimension to allow time-based queries across facts, either at the same or different levels of granularity. Currently the model being built in this course has various date formats in the fact tables (such as ORDER_DATE, SALES_PERIOD) that make time-based queries between facts difficult. Time dimensions also allow for easy rollups, for example, day-based facts can be rolled up to the month level.

A time dimension can be easily created by creating a table with all applicable dates for a time period, ensuring that it includes all required keys, date derivatives, and formats. There are several SQL scripts that can be found on the internet to build time dimensions. You can use any of the popular Internet search engines to find them.

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You can import the time dimension into Framework Manager and create relationships as necessary. If the fact query subjects do not contain the required keys to relate to the time dimension, speak to the database administrator to see if they can be incorporated.

You can also create time keys in Framework Manager using calculations, but this may reduce performance since you are filtering on non-indexed fields.

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Demo 2: Implement a Time Dimension

Purpose:
In order to perform predictable time-based queries, you will import and implement a time dimension.

Components: **Framework Manager**, **Query Studio, Report Studio**

Project: **GO Operational**

Package: **GO Operational**

Task 1. Import Time Dimension metadata.

1. In **Framework Manager**, in the **Project Viewer** pane, expand **Foundation Objects View**, right-click the **gosales** namespace, and then click **Run Metadata Wizard**.
2. Ensure that **Data Sources** is selected, and then click **Next**.
3. Ensure that **GOSALES** is selected, and then click **Next**.
4. In the list of objects, expand **GOSALES**>**Tables**, and then select **TIME_DIMENSION**.
5. Click **Next**, and then click **Import**.
6. Click **Finish**.

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Task 2. Test and adjust TIME_DIMENSION.

1. Drag **TIME_DIMENSION** below the **Staff Region (alias)** query subject to organize it alphabetically.
2. Right-click **TIME_DIMENSION**, click **Launch Context Explorer**, and then click **Show Related Objects**.

 TIME_DIMENSION is a generic query subject with no relationships to other query subjects.
3. Close **Context Explorer**.
4. Right-click **TIME_DIMENSION**, click **Test**, and then click **Test Sample**.

 This query subject is simply a calendar breakdown, giving the time over a certain range in multiple formats. It can be used to join two fact tables with different date formats. In this case, TIME_DIMENSION's DAY_DATE matches the format of Sales Fact's ORDER_DATE and TIME_DIMENSION's CURRENT_YEAR and CURRENT_MONTH match SALES_TARGET's SALES_YEAR and SALES_PERIOD.
5. Click **Close**.
6. Expand **TIME_DIMENSION**, click **CURRENT_YEAR**, and then, in the **Properties** pane beside **Format**, click **<Click to edit>**.

 Note: If your Properties pane is not visible, then from the View menu click Properties.
7. Under **Format type**, select **Number**, set **Use Thousands Separator** to **No**, and then click **OK**.
8. In the **TIME_DIMENSION**, set all query items' **Usage** property identified as Fact to **Attribute**.

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Task 3. Build Relationships to the Facts.

1. In the **Project Viewer** pane, in the **Foundation Objects View**, create the following relationships:

 TIME_DIMENSION (**DAY_DATE**, **1..1**) to
 Sales Fact (**ORDER_DATE**, **1..n**)

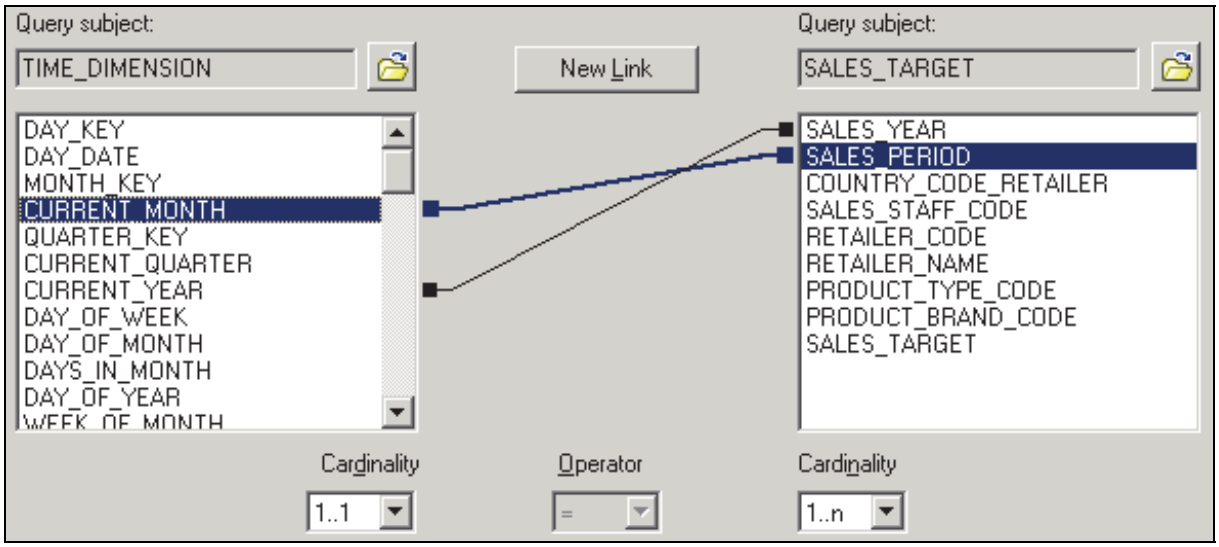
 TIME_DIMENSION (**DAY_DATE**, **1..1**) to
 Returns Fact (**RETURN_DATE**, **1..n**)

2. Create the following relationship but do not close the Relationship dialog box:

 TIME_DIMENSION (**CURRENT_YEAR**, **1..1**) to
 SALES TARGET (**SALES_YEAR**, **1..n**)

3. Click **New Link** to add a second segment to this two-segment relationship:

 TIME_DIMENSION (**CURRENT_MONTH**, **1..1**) to
 SALES TARGET (**SALES_PERIOD**, **1..n**)



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Note the Expression below the linkages:

TIME_DIMENSION.CURRENT_YEAR =
SALES_TARGET.SALES_YEAR
AND TIME_DIMENSION.CURRENT_MONTH =
SALES_TARGET.SALES_PERIOD

This relationship now consists of two values in TIME_DIMENSION that match time period values in SALES_TARGET. The fields used from the TIME_DIMENSION table, in this scenario, are not indexed in the database. This may affect performance. The ideal situation would be to have a month key in the SALES_TARGET table in the database. This would allow you to create your relationship based on one common indexed key in each table. If this is not an option, you should consider asking the database administrator to index the CURRENT_MONTH and CURRENT_YEAR fields in the TIME_DIMENSION table if performance is an issue.

4. Click **OK**.

Task 4. Create the Time model query subject in the Consolidation View.

1. Right-click **Consolidation View**, point to **Create**, and then click **Query Subject**.
2. Name the query subject **Time**, and then, with **Model** selected, click **OK**.
3. In the **Available Model Objects** pane, expand **Foundation Objects View**> **gosales**>**TIME_DIMENSION**.

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4. Add the following query items by double-clicking them, and then click **OK**.

 - **CURRENT_YEAR**
 - **QUARTER_KEY**
 - **CURRENT_QUARTER**
 - **MONTH_KEY**
 - **CURRENT_MONTH**
 - **MONTH_EN**
 - **DAY_KEY**
 - **DAY_DATE**

 You will include only the columns your report authors require.

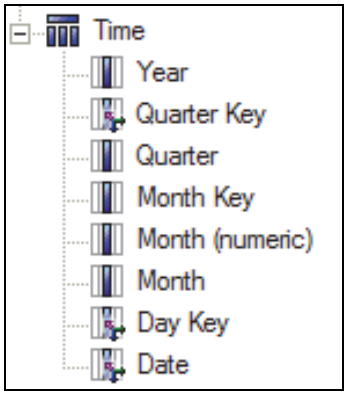
5. Rename the items with more user friendly names.

 - **CURRENT_YEAR** to **Year**
 - **QUARTER_KEY** to **Quarter Key**
 - **CURRENT_QUARTER** to **Quarter**
 - **MONTH_KEY** to **Month Key**
 - **CURRENT_MONTH** to **Month (numeric)**
 - **MONTH_EN** to **Month**
 - **DAY_KEY** to **Day Key**
 - **DAY_DATE** to **Date**

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6. Organize the items as shown below:



7. Drag **Time** above the **Model Filters** folder.
8. Save the project.

Task 5. Prepare the model for multilingual data.

1. Right-click **Model Calculations**, point to **Create** and click **Calculation**.
2. In the **Name** box, type **Month**.
3. In the **Available Components** box, navigate to **Foundation Objects View**> **gosales**>**TIME_DIMENSION** and drag the **MONTH_EN** data item into the **Expression definition** box.
4. In the **Expression definition** box, add **#'** in front of **[gosales]** and replace **EN]** with **' + $Language_lookup{$runLocale} + ']'#**.

 The completed expression should read as follows:

 #'[gosales].[TIME_DIMENSION].[MONTH_'+$Language_lookup {$runLocale}+']'#
5. Click **OK**, and then save the project.

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Task 6. Publish and test package.

1. Publish the **GO Operational** package.
2. In **IBM Cognos Connection**, launch **Query Studio**, and then select the **GO Operational** package.
3. Create a new report with the following items from **Consolidation View**:

Query Subject	Query Item
Time	**Year** **Month (numeric)**
Sales Target Fact	**Sales Target**

The results appear as follows:

Year	Month (numeric)	Sales Target
2004	1	1,786,471,100
2004	2	1,966,069,500
2004	3	2,161,992,700

Knowing your business, and recalling the Sales Target values in the first demo, you can see that monthly sales targets are in the billions and this is too high. Double counting is occurring because there is not enough information specified on the time dimension to allow IBM Cognos to roll up values correctly at the month. You will need to specify determinants for the underlying TIME_DIMENSION query subject to resolve this issue.

You will specify determinants in the next module.

4. Save the query as **Test Time Dimension**.

You will now test a multi-fact query using the Time dimension as a conformed dimension.

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5. Create a new report with the following items from **Consolidation View**:

Query Subject	Query Item
Time	**Year** **Month (Numeric)**
Sales Fact	**Revenue**
Returns Fact	**Return Quantity**

The results appear as follows:

Year	Month (numeric)	Revenue	Return Quantity
2004	1	$72,741,622.65	596
2004	2	$73,242,843.99	8,129
2004	3	$75,720,238.67	10,341
2004	4	$65,278,358.76	17,898
2004	5	$74,695,218.83	27,693
2004	6	$82,169,806.98	43,562
2004	7	$80,723,457.30	50,807

This multi-fact query was accomplished using Time as a conformed dimension to stitch the two fact queries together.

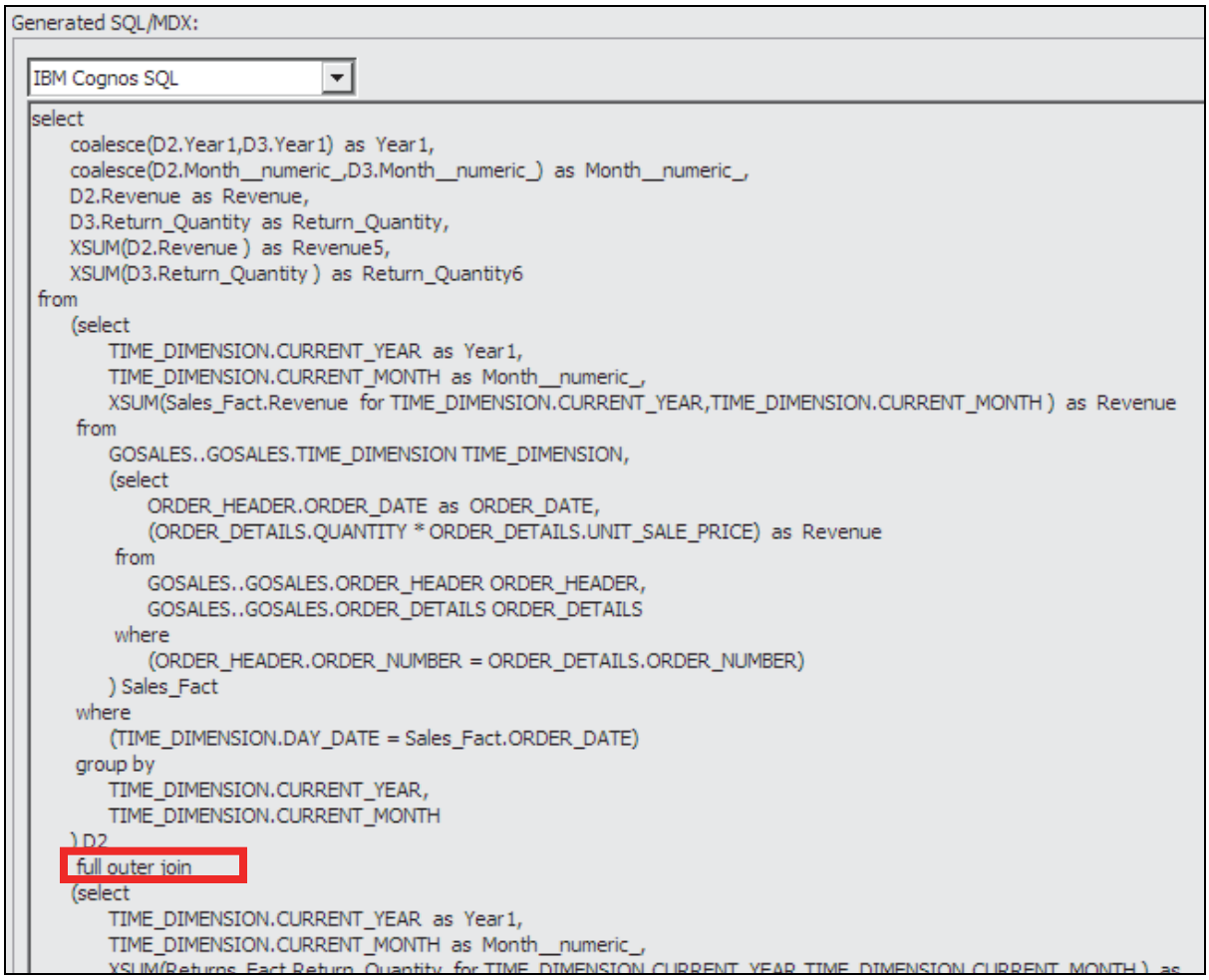
To verify this, you will open the report in Report Studio to view the SQL.

6. Under **Menu**, click **Manage File**, and then click **Open in Report Studio**.
7. In **Report Studio**, from the **Tools** menu, click **Show Generated SQL/MDX**.

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8. From the drop down list, select **IBM Cognos SQL**.

 The results appear as follows:



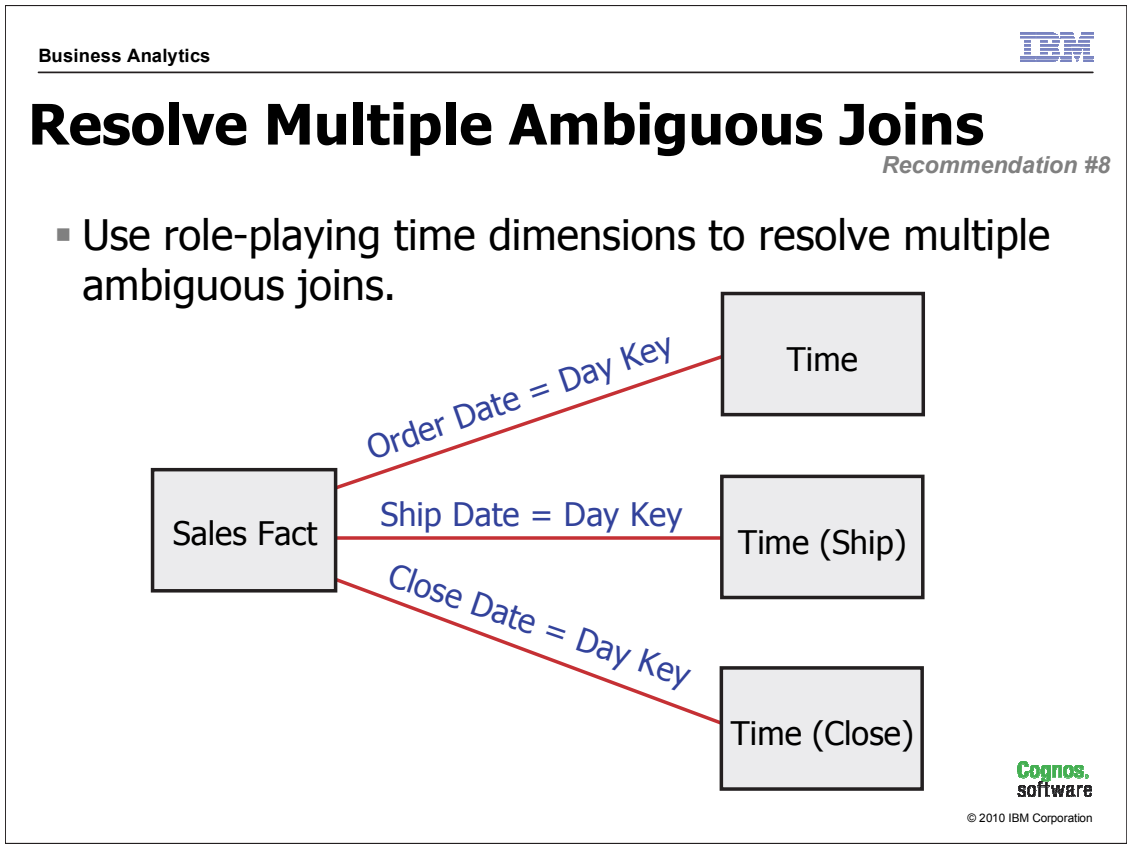
 If you scroll through the SQL, you will see that there are two queries merged together using a full outer join.

9. Click **Close**, close **Report Studio**, and then close your browser.

Results:
By implementing a Time dimension, you can now easily query across fact query subjects. You did however discover that Sales Target values are not correct and will correct this later in the modeling process using determinants.

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A table with multiple valid relationships between itself and another table presents a reporting trap. Sales Fact, for example, has three possible ways of joining to the Time dimension. To ensure that queries use the correct relationship, create two additional aliases for the Time dimension and assign each a role: one links to Sales Fact by Order Date, one by Ship Date, and one by Close Date.

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Demo 3: Resolve Multiple Ambiguous Joins

Purpose:
Report authors require queries based on shipping and closing dates as well as the standard order date. However, while analyzing your model design, you see that this causes multiple relationships between Sales Fact and Time. The proper join may not be performed at run time. You will resolve this ambiguity by creating role-playing dimensions for each relationship.

Component: **Framework Manager**

Project: **GO Operational**

Task 1. Use Model Advisor to Identify the Issue (Instructor-only).

1. In **Foundation Objects View>gosales**, launch the **Context Explorer** for **Sales Fact**, and then double-click the relationship to **TIME_DIMENSION**.

 If necessary, click **Show Related Objects** .

 Note that DAY_DATE is joined to ORDER_DATE, but should also have a relationship to ORDER_CLOSE_DATE and SHIP_DATE.

2. Click **Cancel**, close **Context Explorer**, and then create two more relationships between **TIME_DIMENSION** and **Sales Fact**:

 DAY_DATE (1..1) to **ORDER_CLOSE_DATE** (1..n)

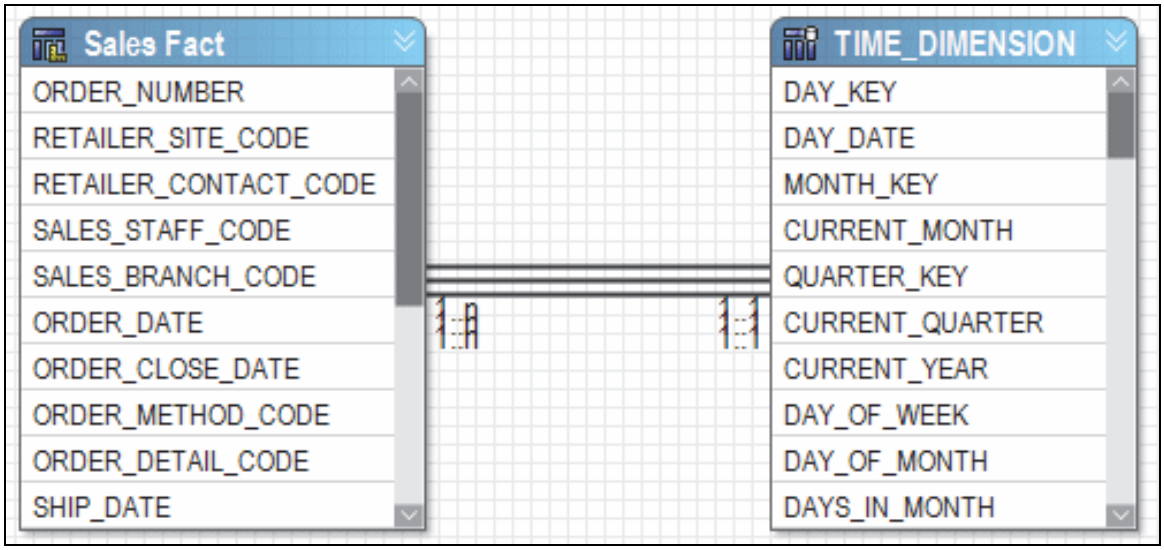
 DAY_DATE (1..1) to **SHIP_DATE** (1..n)

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3. Launch **Context Explorer** for **Sales Fact**, and then click **Show Related Objects**.

 The results appear as follows:



 Notice the multiple relationships between Sales Fact and TIME_DIMENSION. You cannot use the relationships in this state and get expected results. Which relationship should be used and when? There is not enough information for IBM Cognos to select the correct relationship.

 You will implement role playing time dimensions to handle ship dates and close dates.

4. Delete the two new relationships on **SHIP_DATE** and **ORDER_CLOSE_DATE**, and then close the **Context Explorer**.

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Task 2. Create a Role-Playing Dimension.

1. In the **gosales** namespace, create a new model query subject called **Time (Close) (alias)**, and then click **OK**.
2. In the **Available Model Objects** pane, expand **Foundation Objects View**> **gosales**>**TIME_DIMENSION**, and then double-click to add the following query items to the definition:
 - **CURRENT_YEAR**
 - **QUARTER_KEY**
 - **CURRENT_QUARTER**
 - **MONTH_KEY**
 - **CURRENT_MONTH**
 - **MONTH_EN**
 - **DAY_KEY**
 - **DAY_DATE**
3. Click **OK**, and then drag **Time (Close) (alias)** below **TIME_DIMENSION**.
4. Create the following relationship, clicking **No** when prompted to recreate other relationships:

 Time (Close) (alias) (DAY_DATE, 1..1) to **Sales Fact** (ORDER_CLOSE_DATE, 1..n)

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5. In **Time (Close) (alias)**, rename the following data items:
 - **DAY_DATE** to **Close Date**
 - **CURRENT_YEAR** to **Close Year**
 - **QUARTER_KEY** to **Close Quarter Key**
 - **CURRENT_QUARTER** to **Close Quarter**
 - **MONTH_KEY** to **Close Month Key**
 - **CURRENT_MONTH** to **Close Month (numeric)**
 - **MONTH_EN** to **Close Month**
 - **DAY_KEY** to **Close Day Key**
6. Repeat steps **1** to **4** to create **Time (Ship) (alias)** with the following relationship, renaming **DAY_DATE** to **Ship Date**, and moving **Time (Ship) (alias)** below **Time (Close) (alias**).

 Time (Ship) (alias) (Ship Date, 1..1) to **Sales Fact** (SHIP_DATE, 1..n)

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7. In **Time (Ship) (alias)**, rename the following data items:
 - **DAY_DATE** to **Ship Date**
 - **CURRENT_YEAR** to **Ship Year**
 - **QUARTER_KEY** to **Ship Quarter Key**
 - **CURRENT_QUARTER** to **Ship Quarter**
 - **MONTH_KEY** to **Ship Month Key**
 - **CURRENT_MONTH** to **Ship Month (numeric)**
 - **MONTH_EN** to **Ship Month**
 - **DAY_KEY** to **Ship Day Key**

 Tip: You can make a copy of Time (Close) (alias) and edit as required to save time. Also, if you have renamed and prefixed all Time (Close) (alias) query items, when you make a copy, you can use the bulk replace feature to change the Close prefix to a Ship prefix to save time.
8. Double-click **Close Month**, delete the expression in the **Expression definition** box, then double-click the **Month** calculation in the **Foundation Objects View** under **gosales>Reusable Objects>Model Calculations** to add it to the expression. Repeat this process for **Ship Month**.

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9. Select and test the following query items:

Query Subject	Query Item
Sales Fact	**ORDER_NUMBER**
TIME_DIMENSION	**DAY_DATE**
Time (Ship) (alias)	**Ship Date**
Time (Close) (alias)	**Close Date**
Sales Fact	**Quantity**

The results appear as follows:

Test results

ORDER_NUMBER	DAY_DATE	Close Date	Ship Date	Quantity
100001	Jan 12, 2004 12:00:00 AM	Feb 17, 2004 12:00:00 AM	Jan 19, 2004 12:00:00 AM	256
100001	Jan 12, 2004 12:00:00 AM	Feb 17, 2004 12:00:00 AM	Feb 17, 2004 12:00:00 AM	92
100002	Jan 12, 2004 12:00:00 AM	Jan 19, 2004 12:00:00 AM	Jan 19, 2004 12:00:00 AM	162
100002	Jan 12, 2004 12:00:00 AM	Jan 19, 2004 12:00:00 AM	Jan 19, 2004 12:00:00 AM	172
100002	Jan 12, 2004 12:00:00 AM	Jan 19, 2004 12:00:00 AM	Jan 19, 2004 12:00:00 AM	74

Notice that the dates in each column accurately represent the order dates, ship dates, and close dates. For most dates in this test result the close date is the same day as the ship date. But notice that the first record has a later close date. Larger orders do not always ship all products on the same day.

10. Click **Close**, and then save and close the project.

Results:
You saw that multiple relationships between Sales Fact and Time meant that a proper join might not be performed at run time. You resolved this ambiguity by creating role-playing dimensions for the SHIP_DATE and ORDER_CLOSE_DATE relationships.

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Business Analytics

Summary

- You should now be able to:
 - make time-based queries simple to author by implementing a time dimension
 - resolve confusion caused by multiple relationships between a time dimension and another table

Cognos. software

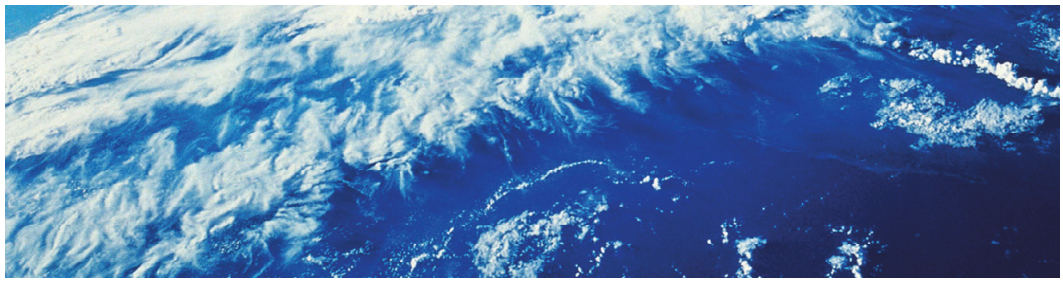
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Specify Determinants

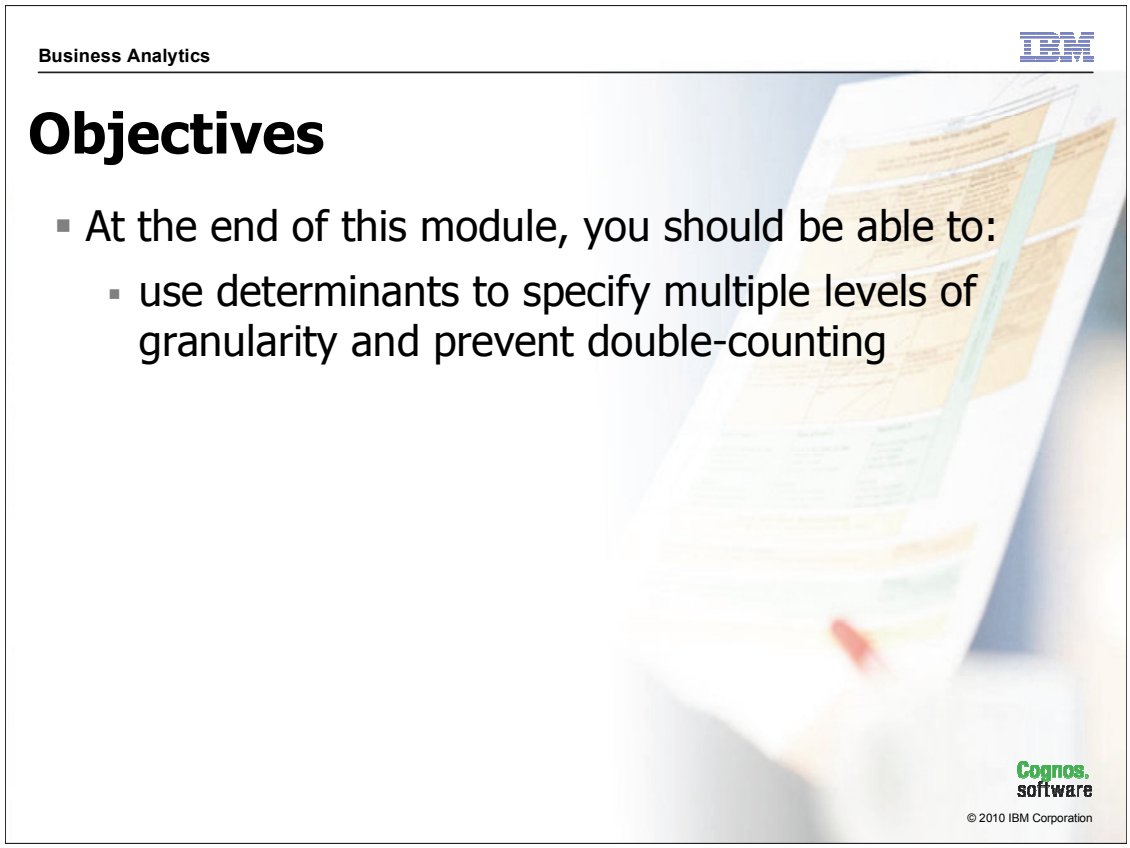
IBM Cognos BI



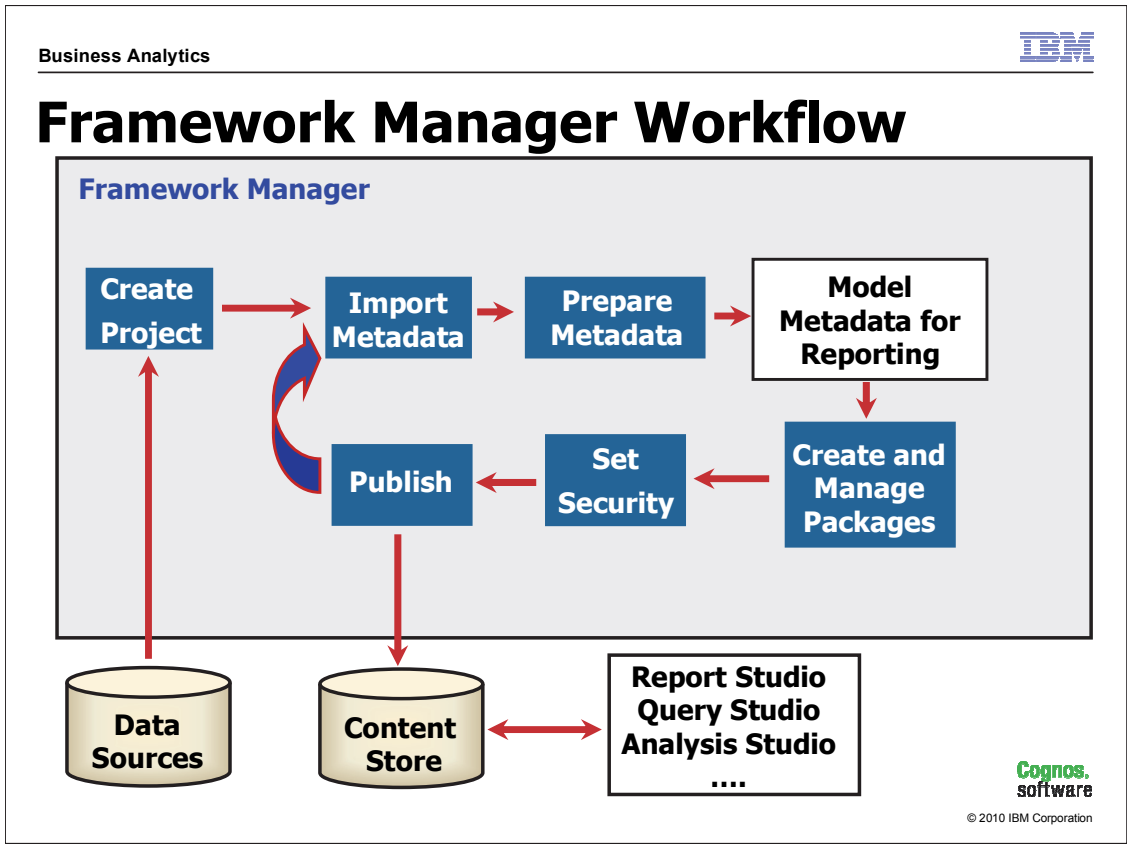
Business Analytics

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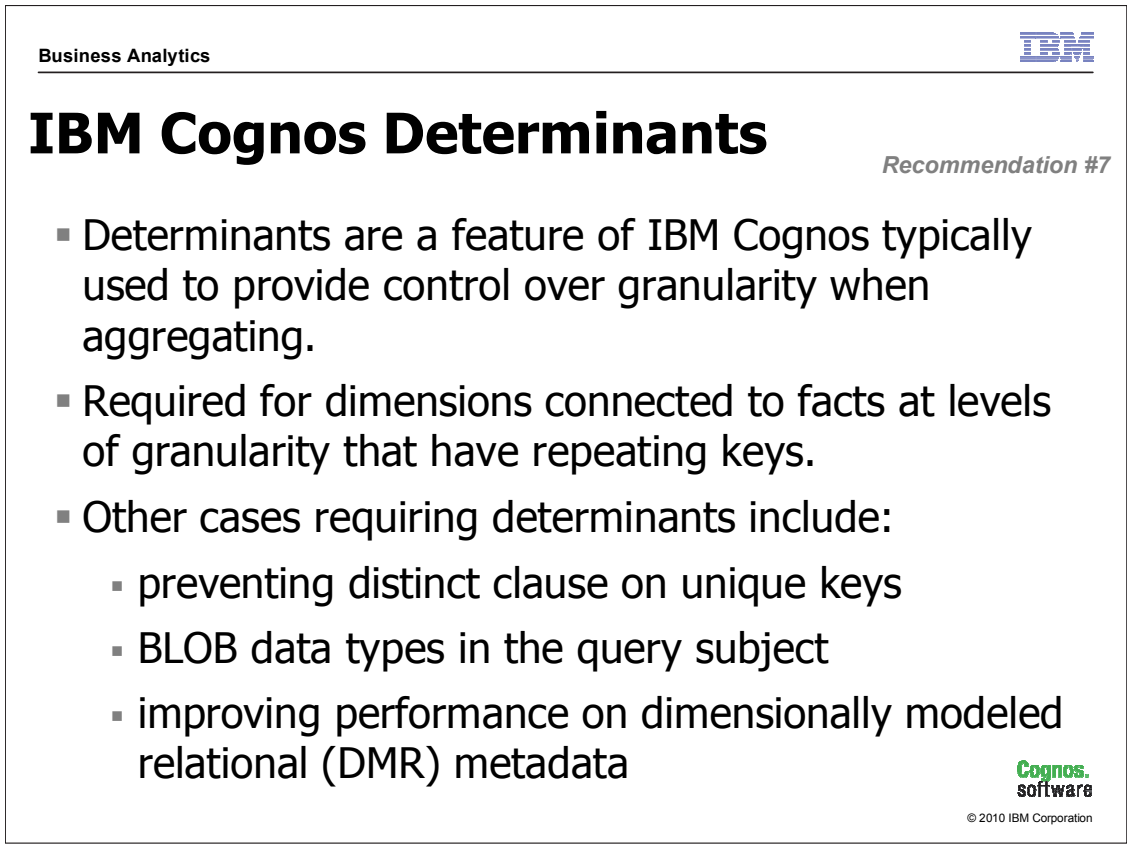


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This module teaches the technique of specifying determinants to prevent double-counting.

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Typically, determinants are specified to provide IBM Cognos with information to correctly aggregate facts in queries. Determinants are tied to the relationships their keys represent and are only used when the corresponding relationship is used in a query.

Determinants on alternate unique values in the data (such as surrogate keys or dates), which may or may not be used in a relationship, can prevent the generation of the distinct clause in the select statement when summarizing the data. Selecting distinct values unnecessarily can reduce performance because you are scanning the entire table or index for a field. If the values are truly unique, then there is no need to scan for distinct values.

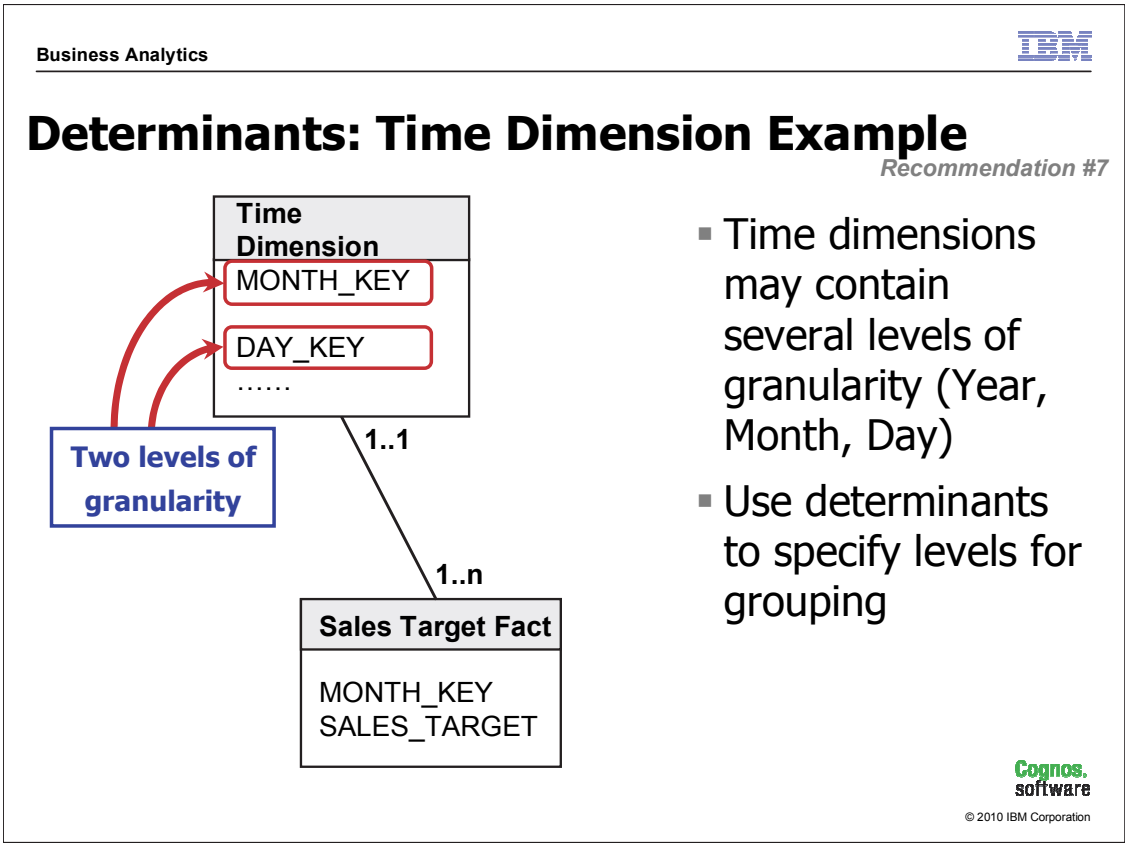
Querying Binary Large Objects (BLOB) requires additional key and index type information. If this information is not present in the data source, you can add it using determinants.

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To leverage indexes with DMR (especially when filtering on captions) associating your captions with the correct key in a determinant will improve query generation.

There is no concept of hierarchy in determinants, although the order in which they are specified does govern the order in which they are evaluated.

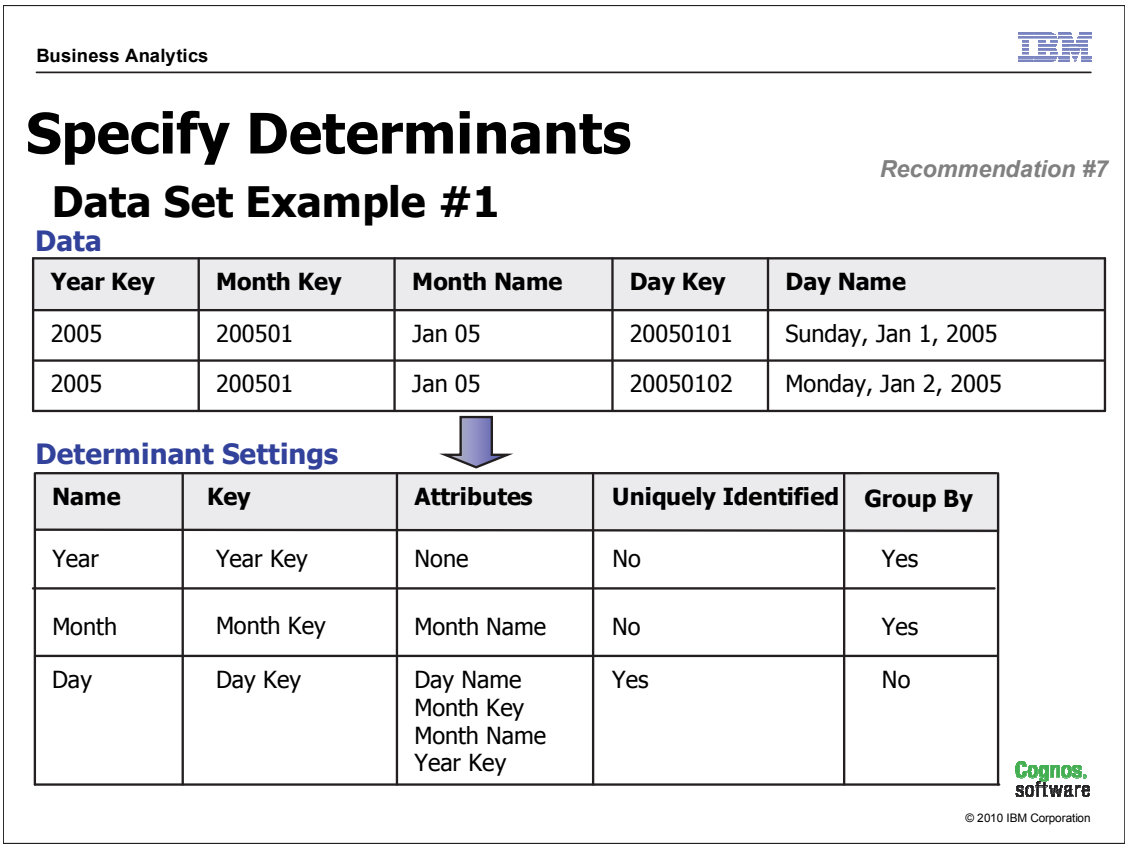
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In the slide example above, each unique instance of MONTH_KEY repeats once for every day in the month.

If you do not tell IBM Cognos that MONTH_KEY requires grouping at the month level, your queries will double-count SALES_TARGET for every day of the month. Setting a determinant at each level of granularity avoids any potential instances of double-counting.

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For the data set above, it is possible to define three determinants, two non-unique determinants (based on Year Key and Month Key), and one unique determinant (based on Day Key).

Day Key is the unique key of the table; therefore you can associate all the columns in the table to this key. Because it is a unique key at the lowest level of granularity, you check the Uniquely Identified setting and do not check the Group By setting.

Month Key is also a key but it is not unique since it repeats in the data (once for every day in the month). Uniquely Identified is not checked for this determinant. If you wanted to query month from this time table, you would write a query that used select min function syntax and group by the Month Key. That is why you check the Group By box in the determinant setting.

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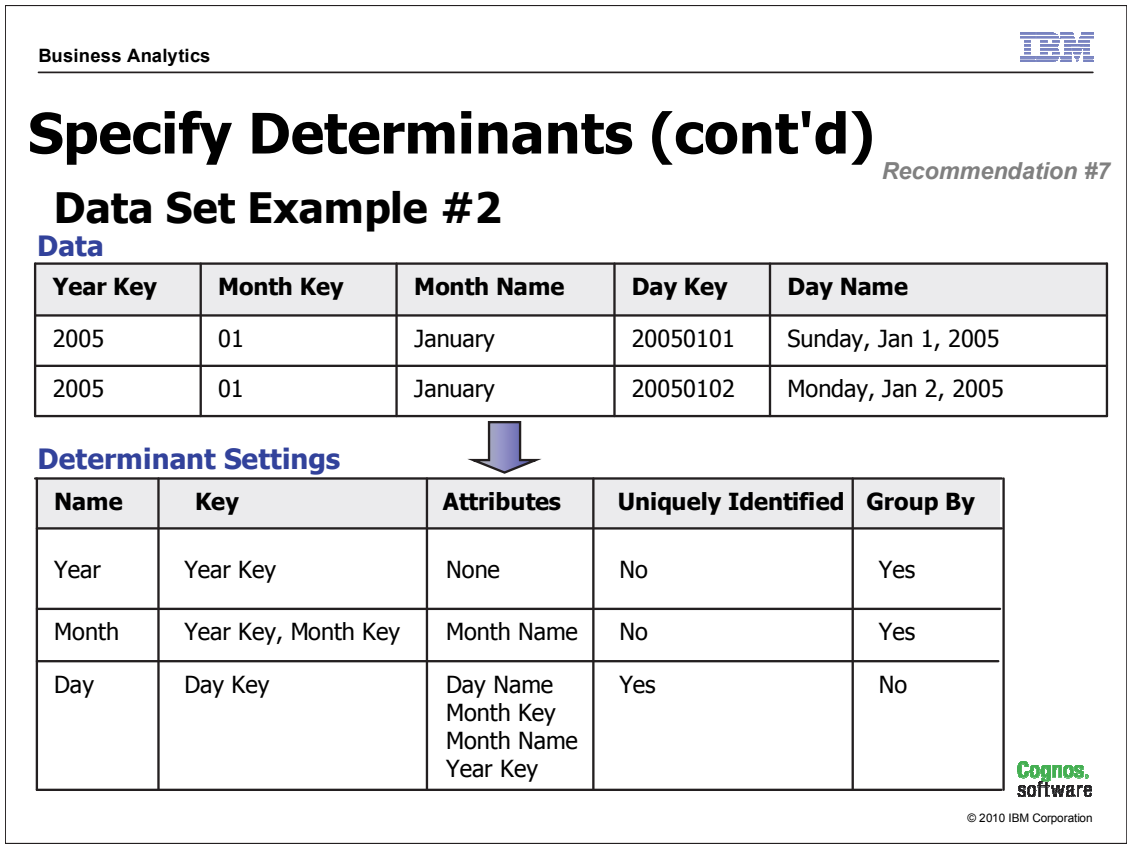
Similar logic is applied to the Year determinant.

When a query is created using a column from the table above, the IBM Cognos query engine evaluates the determinants, based on the relationship used in the query, one at a time until it finds the column reference (either the key or an attribute of the key) in a determinant and then stops when it finds it. For example, if you chose Month Name and Sales Target (Sales Target has a relationship to the Time dimension on the Month Key), IBM Cognos would evaluate the Year determinant and see that there is no reference to Month Name. It would then move on to the Month determinant and find the Month Name reference and stop evaluating. It would then generate the appropriate SQL and group on the Month Key.

Ensure that the key for each determinant includes the key or keys that identify the data set.

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In the event a key requires another key to provide uniqueness to identify the row of data, you need to nest the keys. For example, looking at the Month Key above, you can not identify which year it belongs to without looking at the Year Key. Therefore, the Month determinant nests the Year Key and the Month Key to generate the proper grouping in the SQL at run time. In this case the grouping would combine Year Key and Month Key.

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Demo 1: Specify Determinants on the Time Dimension

Purpose:
A typical business report compares the monthly sales targets to actual sales. In a previous test you discovered that sales target values were being double-counted in report summary footers. You will specify determinants on TIME_DIMENSION to correct this problem.

Components: **Framework Manager**, **Query Studio**

Project: **GO Operational**

Package: **GO Operational**

Task 1. Review double-counting issue.

1. In **Framework Manager**, close any projects that may be open, and then open the **GO Operational** project located at **C:\Edcognos\B5152\CBIFM-Start Files\Module 11\GO Operational**.
2. If prompted, log in as User ID **admin**, and Password **Education1!**.
3. Launch **IBM Cognos Connection**, log on, and then click **IBM Cognos content**.

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4. Click **GO Operational**, and then click **Test Time Dimension**.

 The results appear as follows:

Year	Month (numeric)	Sales Target
2004	1	1,786,471,100
2005	1	2,336,209,600
2006	1	2,677,280,900
2007	1	3,666,501,440
2004	2	1,966,069,500
2005	2	2,580,578,000
2006	2	3,199,294,000
2007	2	4,402,913,200
2004	3	2,161,992,700

 Again, knowing your business, you can see that monthly sales targets are in the billions, which is too high. Double counting occurs because there is not enough information specified on the time dimension to allow IBM Cognos to roll up values correctly at the month. The target value is counted once for every day in a month rather than just once for each month. You will specify determinants for the underlying TIME_DIMENSION query subject to resolve this issue.

5. Click **Return** in the top right corner.

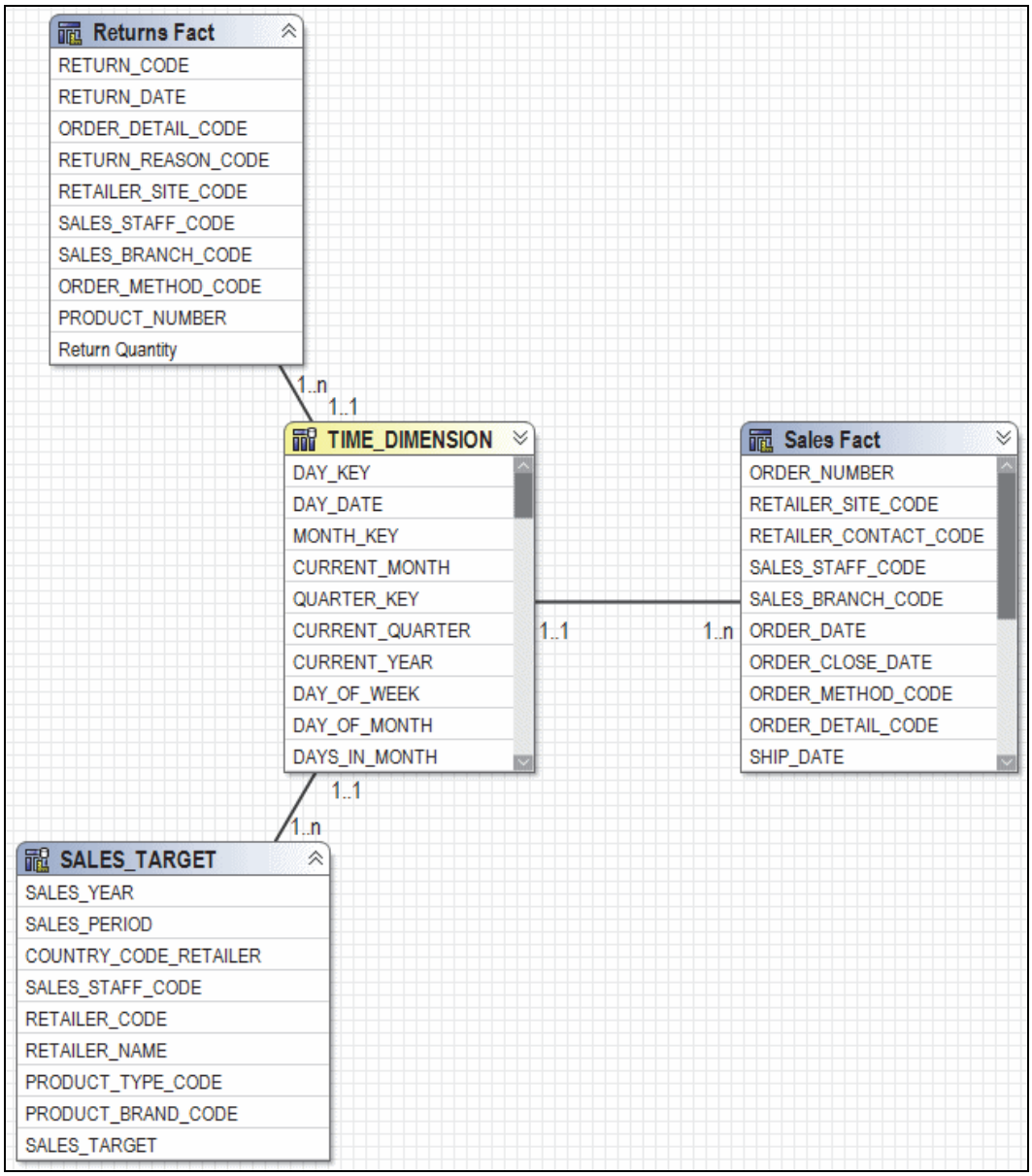
Task 2. Examine keys and unique values in TIME_DIMENSION.

1. In **Framework Manger**, in **Foundation Objects View>gosales**, right-click **TIME_DIMENSION**, and then click **Launch Context Explorer**.
2. Click **Show Related Objects**, click **Auto Layout**, ensure **Star** is selected, and then click **Apply**.

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3. Click **Close**.

The results appear similar to as follows:



When specifying determinants, it is good practice to view the relationships to the object and examine the keys used in the relationships. In this case DAY_DATE, not DAY_KEY, is used to relate to Returns Fact and Sales Fact. This is an important piece of information for your determinant at the day level. Also, the relationship to SALES_TARGET is based on CURRENT_YEAR and CURRENT_MONTH. The determinants should reflect the relationships.

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Before applying determinants on TIME_DIMENSION you will also quickly test effects of having no determinants on a unique value in the data. In this case DAY_DATE is unique.

4. Close **Context Explorer**, expand **TIME_DIMENSION** and then test the **DAY_DATE** query item with **Auto Sum** enabled.
5. Click the **Query Information** tab.

 The results appear as follows:

Cognos SQL

```
select distinct
       TIME_DIMENSION.DAY_DATE  as  DAY_DATE
 from
       GOSALES.GOSALES.gosales.TIME_DIMENSION TIME_DIMENSION
```

 Notice the distinct clause in the select statement. This is unnecessary as the DAY_DATE values in this table are all unique. You will now specify determinants to reflect your relationships and also observe that the distinct clause will not be applied when querying DAY_DATE.

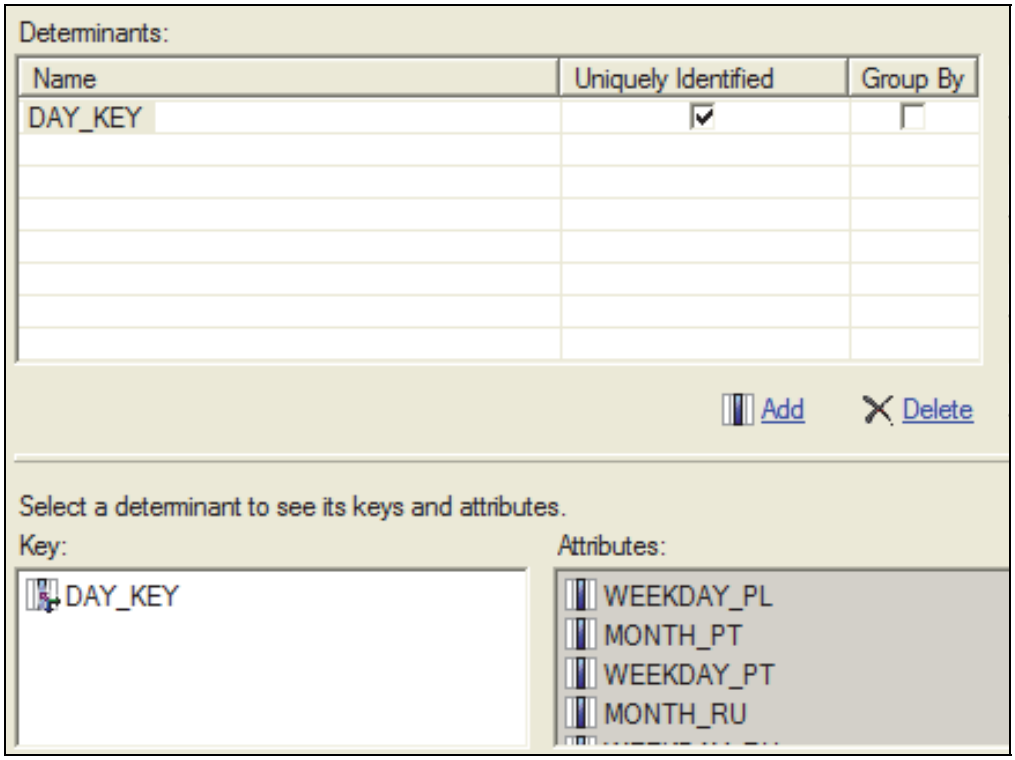
6. Click **Close**.

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Task 3. Specify determinants in TIME_DIMENSION.

1. In the **Project Viewer**, double-click **TIME_DIMENSION**, and then click the **Determinants** tab.

 The results appear as follows:



 During import, the primary key value is used to create a determinant for you. This value is unique and therefore all other values in the table can be associated with it. But in the case of your relationship to Sales Fact and Returns Fact, the DAY_KEY is not used in the relationship but rather DAY_DATE. You will alter this determinant to reflect your relationship.

2. Under **Key**, select **DAY_KEY**, and then press **Delete**.
3. Under **Available items**, drag **DAY_DATE** to the **Key** pane.

 You will now add the remaining determinants.

4. Under the **Determinants** pane, click **Add**.

 New Determinant appears below DAY_KEY in the Determinants pane.

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5. Right-click **New Determinant**, and then click **Rename**.
6. Type **Year**, and then press **Enter**.
7. Click the **Up Arrow** key on the right to move **Year** above **DAY_KEY**.
8. From the **Available items** pane, drag **CURRENT_YEAR** to the **Key** pane.
9. Select the **Group By** check box beside **Year**.
10. Repeat steps **4** to **9** to create **Quarter**, with Key = **QUARTER_KEY**.
11. With the focus still on **Quarter**, drag **CURRENT_QUARTER** into the **Attributes** box.
12. Repeat steps **4** to **9** to create **Month**, with two Keys = **CURRENT_MONTH** and **CURRENT_YEAR**.

 CURRENT_MONTH and CURRENT_YEAR are used as the key for this determinant since the relationship to SALES_TARGET is based on those two query items. These two fields uniquely identify the relationship to SALES_TARGET and therefore will be used to correctly aggregate sales target values.
13. With the focus still on **Month**, drag the following items into the **Attributes** box: **MONTH_KEY** and all **MONTH_xx** items.

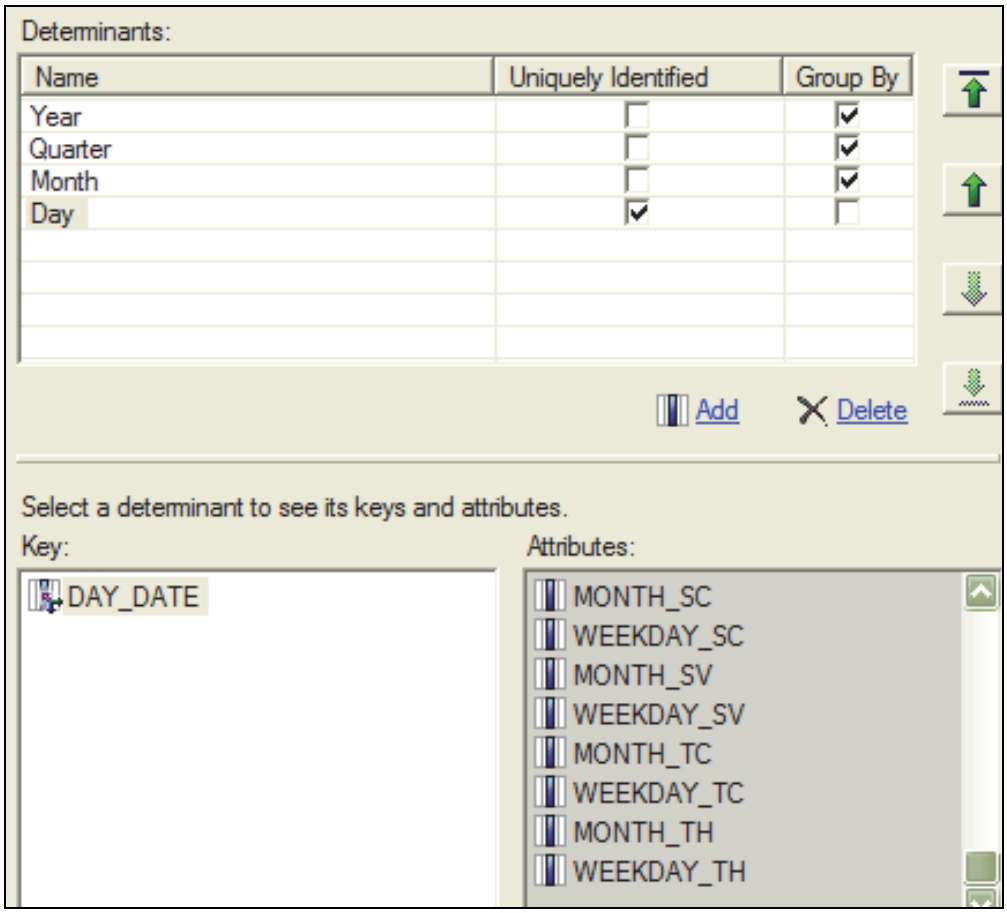
 Tip: Select the items using the Ctrl key. Then right-click one of the items and then click Add as Attributes.

 Typically MONTH_KEY would be used as the key for a determinant describing month data values. In this case however, MONTH_KEY is not used in any relationships, and therefore can act as an attribute of the Month determinant should the value be required in a report. If in the future you use this key in a relationship, you would need to reflect this in your determinants. You would need to create a new determinant to represent that relationship. Again, the ideal situation is to use a month key exclusively and consistently across all facts that report at the month level. These types of keys should be requested from the database administrator if they do not exist.

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14. Rename the **DAY_KEY** determinant to **Day**.

 The results appear as follows:



15. Click **OK**, and then save the project.

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Task 4. Re-test DAY_DATE.

1. Under **TIME_DIMENSION**, test **DAY_DATE** with **Auto Sum** enabled, and then click the **Query Information** tab.

 The results appear as follows:

 Cognos SQL

```
select
       TIME_DIMENSION.DAY_DATE  as  DAY_DATE
 from
       GOSALES..GOSALES.TIME_DIMENSION TIME_DIMENSION
```

 Notice that there is no longer a distinct clause in your select statement. This is because you have identified the DAY_DATE as the key and as being unique, therefore the IBM Cognos query engine has enough information to know it does not need to scan the table for distinct values. If you required another relationship later on using the DAY_KEY, then you would also specify a determinant on it and set it as unique. It is OK to have more than one unique determinant if they are truly unique. At query time, the relationship being used will determine which unique determent to use. If more than one relationship to a unique determinant is used, then each related determinant will be used in the query.

2. Click **Close**.

Task 5. Publish and Test the Package.

1. Publish the **GO Operational** package.
2. In **IBM Cognos Connection**, click **Test Time Dimension** to run the report again.

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3. When prompted to update the report, click **OK**.

 The results appear as follows:

Year	Month (numeric)	Sales Target
2004	1	57,628,100
2004	2	67,795,500
2004	3	69,741,700
2004	4	59,954,700
2004	5	67,525,900
2004	6	73,594,900

 You now have accurate sales targets.

4. Under **Menu**, click **Insert Data**.

5. From the **Consolidation View**, add **Time>Date** and **Sales Fact>Revenue** to the report.

6. Select **Year** and **Month (numeric)** and click **Group** .

 The results appear as follows:

Year	Month (numeric)	Sales Target	Date	Revenue
2004	1	57,628,100	Jan 12, 2004 12:00:00 AM	$39,036,796.40
		57,628,100	Jan 13, 2004 12:00:00 AM	$11,488,458.59
		57,628,100	Jan 14, 2004 12:00:00 AM	$3,232,160.48
		57,628,100	Jan 15, 2004 12:00:00 AM	$3,080,441.44
		57,628,100	Jan 16, 2004 12:00:00 AM	$1,976,896.69
		57,628,100	Jan 19, 2004 12:00:00 AM	$2,159,831.74
		57,628,100	Jan 20, 2004 12:00:00 AM	$2,558,694.30
		57,628,100	Jan 21, 2004 12:00:00 AM	$2,935,024.72
		57,628,100	Jan 22, 2004 12:00:00 AM	$3,559,670.33
		57,628,100	Jan 23, 2004 12:00:00 AM	$2,371,064.81
		57,628,100	Jan 24, 2004 12:00:00 AM	$342,583.15
	1	**57,628,100**		**$72,741,622.65**
	2	67,795,500	Feb 9, 2004 12:00:00 AM	$28,342,788.42
		67,795,500	Feb 10, 2004 12:00:00 AM	$5,833,384.16

 Note that although the sales targets repeat (because they are not at the day level) they are not double counted at the Month grouping level.

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7. Select the **Year** column, and then click **Filter**.
8. Set the **From** and **To** boxes to **2004**, and then click **OK**.
9. Select **Month (numeric)** column, and then click **Filter**.
10. Set the **From** and **To** boxes to **1**, and then click **OK**.

The results appear similar as follows:

Year: 2004 AND Month (numeric): 1

Year	Month (numeric)	Sales Target	Date	Revenue
2004	1	57,628,100	Jan 12, 2004 12:00:00 AM	$39,036,796.40
		57,628,100	Jan 13, 2004 12:00:00 AM	$11,488,458.59
		57,628,100	Jan 14, 2004 12:00:00 AM	$3,232,160.48
		57,628,100	Jan 15, 2004 12:00:00 AM	$3,080,441.44
		57,628,100	Jan 16, 2004 12:00:00 AM	$1,976,896.69
		57,628,100	Jan 19, 2004 12:00:00 AM	$2,159,831.74
		57,628,100	Jan 20, 2004 12:00:00 AM	$2,558,694.30
		57,628,100	Jan 21, 2004 12:00:00 AM	$2,935,024.72
		57,628,100	Jan 22, 2004 12:00:00 AM	$3,559,670.33
		57,628,100	Jan 23, 2004 12:00:00 AM	$2,371,064.81
		57,628,100	Jan 24, 2004 12:00:00 AM	$342,583.15
	1	**57,628,100**		**$72,741,622.65**
2004		**57,628,100**		**$72,741,622.65**
Summary		**57,628,100**		**$72,741,622.65**

This will give you a smaller data set to conduct your next test. You will now add Product Line from Products to see the results.

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11. From **Products**, drag **Product Line** onto the report after **Month (numeric)**, and then click the **Bottom** link.

 The results appear similar as follows:

Year: 2004 AND Month (numeric): 1

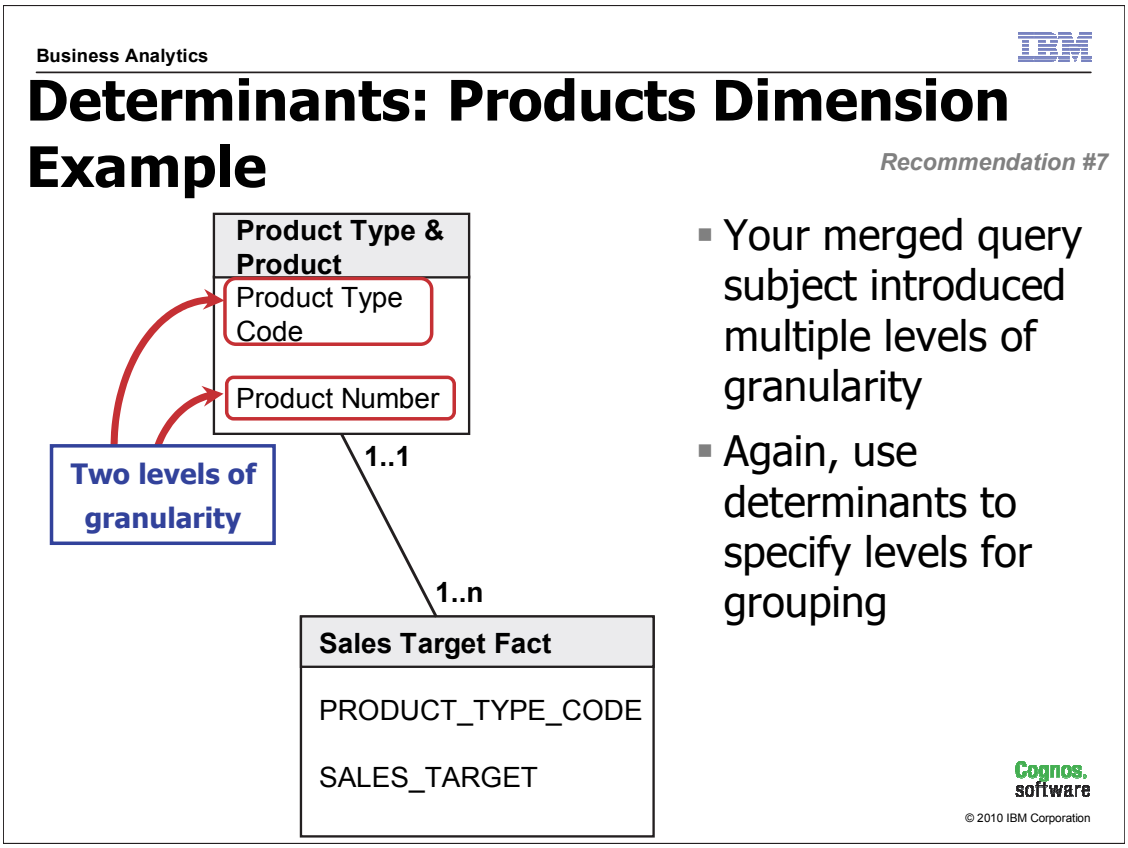
Year	Month (numeric)	Product Line	Sales Target	Date	Revenue
2004	1	Outdoor Protection	12,396,500	Jan 12, 2004 12:00:00 AM	$2,263,380.47
		Outdoor Protection	12,396,500	Jan 13, 2004 12:00:00 AM	$474,025.75
		Outdoor Protection	12,396,500	Jan 14, 2004 12:00:00 AM	$91,322.21
		Outdoor Protection	12,396,500	Jan 15, 2004 12:00:00 AM	$62,434.09
		Outdoor Protection	12,396,500	Jan 16, 2004 12:00:00 AM	$80,466.92
		Outdoor Protection	12,396,500	Jan 19, 2004 12:00:00 AM	$11,686.08
		Outdoor Protection	12,396,500	Jan 21, 2004 12:00:00 AM	$22,214.32
		Outdoor Protection	12,396,500	Jan 22, 2004 12:00:00 AM	$83,753.03
		Outdoor Protection	12,396,500	Jan 23, 2004 12:00:00 AM	$50,249.28
		Personal Accessories	1,220,801,200	Jan 12, 2004 12:00:00 AM	$7,414,443.06
		Personal Accessories	1,220,801,200	Jan 13, 2004 12:00:00 AM	$3,477,197.59
		Personal Accessories	1,220,801,200	Jan 14, 2004 12:00:00 AM	$2,118,932.80
		Personal Accessories	1,220,801,200	Jan 15, 2004 12:00:00 AM	$1,858,835.02
		Personal Accessories	1,220,801,200	Jan 16, 2004 12:00:00 AM	$1,557,191.77
		Personal Accessories	1,220,801,200	Jan 19, 2004 12:00:00 AM	$1,931,953.91
		Personal Accessories	1,220,801,200	Jan 20, 2004 12:00:00 AM	$2,558,694.30
		Personal Accessories	1,220,801,200	Jan 21, 2004 12:00:00 AM	$2,557,571.92
		Personal Accessories	1,220,801,200	Jan 22, 2004 12:00:00 AM	$2,329,018.16
		Personal Accessories	1,220,801,200	Jan 23, 2004 12:00:00 AM	$1,869,246.87
		Personal Accessories	1,220,801,200	Jan 24, 2004 12:00:00 AM	$342,583.15
	1		**1,440,860,600**		**$72,741,622.65**
2004			**1,440,860,600**		**$72,741,622.65**
Summary			**1,440,860,600**		**$72,741,622.65**

 The sales target values are double-counted. You will examine and correct this issue in the next workshop.

12. Save the report as **Products Dimension Test**, and then close your browser.

Results:
By specifying determinants on TIME_DIMENSION, you were able to correct a double-counting problem that occurred with sales targets.

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In the slide example above, the Product Type & Product query subject is a query subject you merged earlier to remove ambiguity from PRODUCT_TYPE. Each unique instance of Product Type Code repeats once for every related product. If you do not specify determinants, sales target values will be double-counted for every product belonging to a particular product type.

Again, you need to provide information to the IBM Cognos query engine that indicates Product Type Code requires grouping when queried against sales targets.

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Workshop 1: Specify Determinants

Earlier in the modeling process, you merged some query subjects together to resolve ambiguous query subjects. You merged PRODUCT_TYPE and PRODUCT to create Product Type & Product, and you merged RETAILER and RETAILER_SITE to create Retailer & Retailer Site. Both these query subjects now present multiple levels of granularity in them and cause double-counting when querying against sales targets.

You will resolve this by specifying determinants on:

- Product Type & Product
 - PRODUCT_NUMBER is unique
 - Group on PRODUCT_TYPE_CODE and add appropriate attributes
- Retailer & Retailer Site
 - RETAILER_SITE_CODE is unique
 - Group on RETAILER_CODE and add appropriate attributes

Test the Product Type & Product determinants using the Product Dimension Test report in IBM Cognos Connection.

For more detailed information outlined as tasks, see the Task Table on the next page.

To see the desired filters, see the Workshop Results section that follows the Task Table.

Save the project when you are finished.

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Workshop 1: Task Table

Task	Where to Work	Hints
1. Specify determinants for Product Type & Product.	Project Viewer, Query Subject Definition	• Double-click the query subject • Click the Determinants tab • Click Add • Name determinant Product • Add PRODUCT_NUMBER as the key • Select Uniquely Identified checkbox • Add new determinant called Product Type • Add PRODUCT_TYPE_CODE as the key • Add PRODUCT_LINE_CODE and all PRODUCT_TYPE_xx items to the Attributes pane • Select Group By check box • Move Product Type determinant to the top

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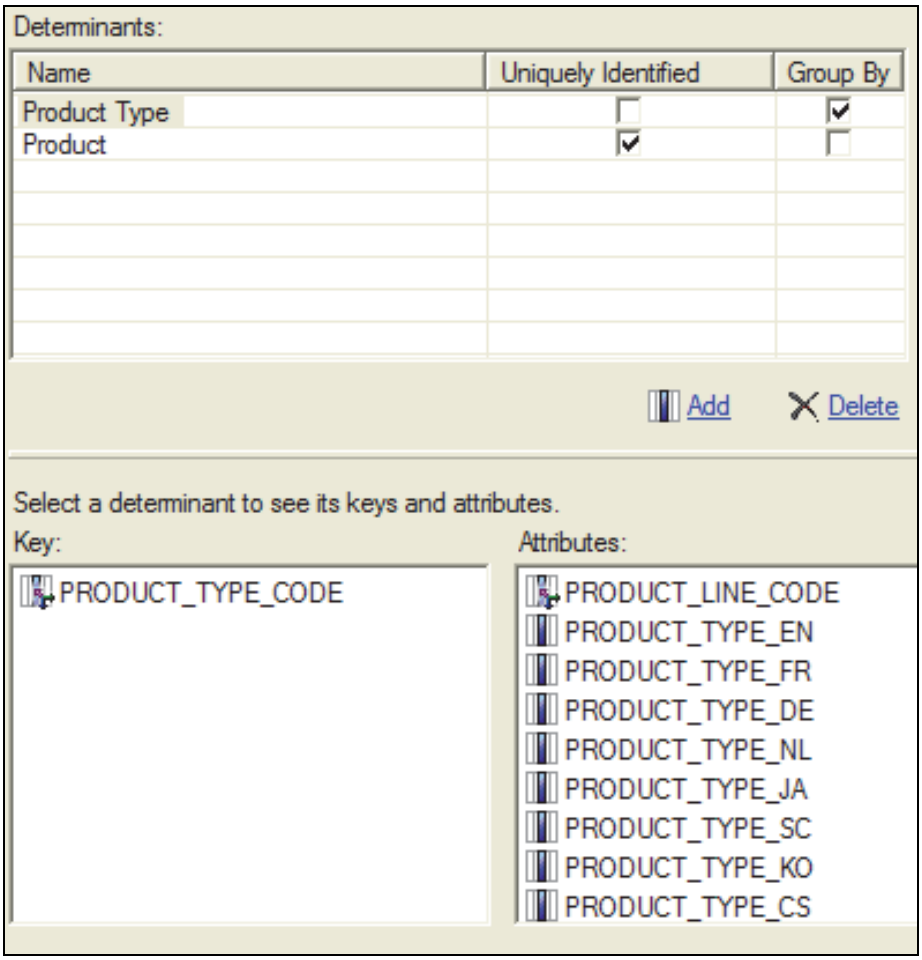
Task	Where to Work	Hints
2. Specify determinants for Retailer & Retailer Site.	Project Viewer, Query Subject Definition	• Double-click the query subject • Click the Determinants tab • Click Add • Name determinant Retailer Site • Add RETAILER_SITE_CODE as the key • Select Uniquely Identified checkbox • Add new determinant called Retailer • Add RETAILER_CODE as the key • Add COMPANY_NAME, COMPANY_NAME_MB, RETAILER_TYPE_CODE, and RETAILER_START_DATE to the Attributes pane • Select Group By check box • Move Retailer determinant to the top • Save project
3. Test Products Dimension Test report.	IBM Cognos Connection	• Publish Go Operational package • Launch IBM Cognos Connection and run Products Dimension Test • Close IBM Cognos Connection without saving and close Framework Manager, saving changes.

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Workshop 1: Workshop Results

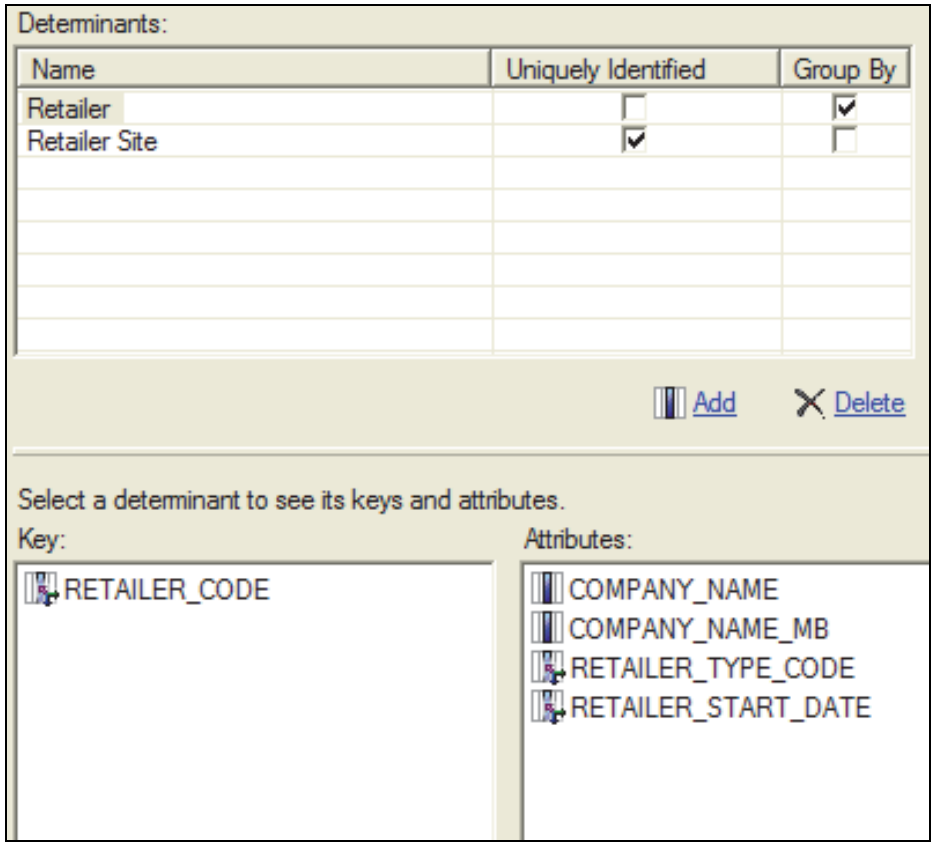
Your Product Type & Product determinants should appear as shown below:



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Workshop 1: Workshop Results

Your Retailer & Retailer Site determinants should appear as shown below:



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Workshop 1: Workshop Results

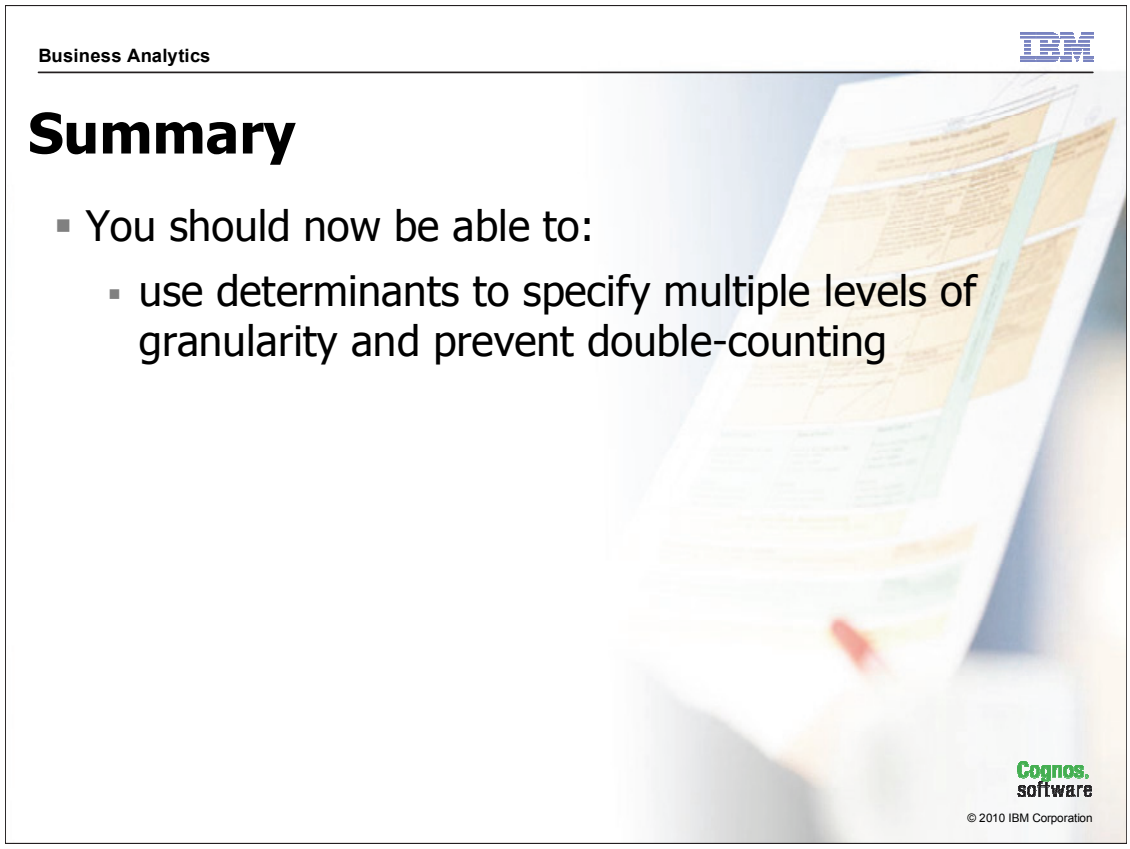
After scrolling to the bottom of the Products Dimension Test report, the results should appear similar as shown below:

Year: 2004 AND Month (numeric): 1

Year	Month (numeric)	Product Line	Sales Target	Date	Revenue
2004	1	Outdoor Protection	2,479,300	Jan 14, 2004 12:00:00 AM	$91,322.21
		Outdoor Protection	2,479,300	Jan 15, 2004 12:00:00 AM	$62,434.09
		Outdoor Protection	2,479,300	Jan 16, 2004 12:00:00 AM	$80,466.92
		Outdoor Protection	2,479,300	Jan 19, 2004 12:00:00 AM	$11,686.08
		Outdoor Protection	2,479,300	Jan 21, 2004 12:00:00 AM	$22,214.32
		Outdoor Protection	2,479,300	Jan 22, 2004 12:00:00 AM	$83,753.03
		Outdoor Protection	2,479,300	Jan 23, 2004 12:00:00 AM	$50,249.28
		Personal Accessories	22,218,600	Jan 12, 2004 12:00:00 AM	$7,414,443.06
		Personal Accessories	22,218,600	Jan 13, 2004 12:00:00 AM	$3,477,197.59
		Personal Accessories	22,218,600	Jan 14, 2004 12:00:00 AM	$2,118,932.80
		Personal Accessories	22,218,600	Jan 15, 2004 12:00:00 AM	$1,858,835.02
		Personal Accessories	22,218,600	Jan 16, 2004 12:00:00 AM	$1,557,191.77
		Personal Accessories	22,218,600	Jan 19, 2004 12:00:00 AM	$1,931,953.91
		Personal Accessories	22,218,600	Jan 20, 2004 12:00:00 AM	$2,558,694.30
		Personal Accessories	22,218,600	Jan 21, 2004 12:00:00 AM	$2,557,571.92
		Personal Accessories	22,218,600	Jan 22, 2004 12:00:00 AM	$2,329,018.16
		Personal Accessories	22,218,600	Jan 23, 2004 12:00:00 AM	$1,869,246.87
		Personal Accessories	22,218,600	Jan 24, 2004 12:00:00 AM	$342,583.15
	1		**57,628,100**		**$72,741,622.65**
2004			**57,628,100**		**$72,741,622.65**
Summary			**57,628,100**		**$72,741,622.65**

Sales Target Values are not double-counted.

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